Full Throttle

Pushing The Envelope Of Flight Simulation!

February/March 2000
Vol. 7 No. 1
USA $7.95

Aerobatic Manuevers In Flight Sim

Round Robin Adventure

Creating Your Own CFS Missions

Virtual Flight School

3-D Video Cards & Wingman Joysticks

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Full Throttle

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Pilot's Note: This information is not intended for use in actual flying situations. While the information is as realistic as possible, you should not use it for actual flying instruction. *Safe flying!*

From the Editor

Now that we have entered the new millenium (and left Y2K worries behind), we see many new horizons for both general aviation and combat flight simulation. With each new version of the various simulator programs, more great features are incorporated.

The most noticeable of these are more realistic flight characteristics and visual effects. Perhaps the most dramatic improvement we see these days is the view out the window. And of course, taking advantage of these new features requires the simulation enthusiast to add more power to his/her computer system. The manufacturers of the hardware and drivers must also update their products to ensure compatibility for the complex new drawing instructions. To address these concerns, we continue to offer information on new hardware and tips on system configuration. As an ongoing feature, *Full Throttle* offers two new reviews of 3-D accelerator cards by Rod White. This time, we are looking at new video cards from ATI.

Another dramatic improvement in flight simulation is in the theater of realism—the ability of the simulator to provide a virtual experience very close to that of a real-world pilot. Advanced flight dynamics, aircraft functions and general navigation procedures have been overlooked by many simulation enthusiasts until now, because the programs could not accurately simulate them.

To take advantage of these new aspects of virtual aviation, flight sim enthusiasts are re-learning a lot of things they took for granted before. *Full Throttle* will continue to offer feature articles in each issue that bring these real-world aspects into the virtual pilot's experience. In this issue, Jim Rhoads guides you through the basics of VOR navigation. In future issues, we will discuss real-world aircraft operations, approach and landing procedures, take-off procedures and general navigation. I hope these features will breathe new life into your virtual aviation experience.

Our other hardware and software reviews will also take the lead in providing you with information about add-ons for the newest simulators on the market. Whenever possible, we will focus on packages for the very latest versions of the various general aviation and combat simulators.

As always, we invite your comments, suggestions and questions.

Keep the blue on top!

Tim Dickens

Managing Editor

NOTAMs - New Products 6

Full Throttle Interviews Patty Wagstaff .. 14

Patty Wagstaff has flown airshows and competitions throughout the world in front of millions of spectators each year. Her breath-taking low-level airshow performances give spectators a front row seat view of the precision and complexity of unlimited aerobatics. Full Throttle interviews her and lets you in on how she performs her aerobatic maneuvers and what makes her a top draw at airshows everywhere.

Aerobatic Maneuvers You Can Do in Flight Sim 20

After reading the interview with Patty you may think that she has fun flying around the country and performing aerobatics at different airports. However, aerobatic flying is not as easy as what you might think...even in Flight Simulator. We'll show you how to do some maneuvers in FS 98 or FS 2000 using the same airplane that Patty flies in her shows — the Extra 300. See if it is as easy as you think.

Creating Your Own CFS Missions . 28

Chris Steele continues his series on creating missions in Combat Flight Simulator. You may be amazed at how easy it is to create missions!

Virtual Flight School: VOR Navigation ... 34

Although GPS navigation is probably the most accurate way to navigate today, many aircraft still rely on VOR navigation. This feature will provide you with basic and advanced "real world" techniques in both flight and navigation that you can incorporate into your simulator experience.

Round Robin Adventure 40

This Round Robin takes place in the breathtaking landscape of an Alaskan winter. The highlight is a descent in a bay that is flanked by high mountains and where there is no room for error in navigation.

Looking Closely at FS 2000 Scenery 44

Microsoft's *Flight Simulator 2000* (FS 2000) marks a major step forward in flight simulator technology. This new version incorporates Elevated Mesh Terrain (EMT) scenery. Read (and learn how) the basic nature of FS scenery has changed.

The Latest 3-D Video Cards 52

In this issue we'll look at two very impressive cards that do more than just accelerate your favorite flight/combat simulations and 3-D games.

Two New Logitech Joysticks 55

We'll look at two new joysticks from Logitech in this issue: WingMan Extreme Digital 3D WingMan Attack.

Web Watch: Internet Sites for Simmers 57

Adam Howe presents this issue's picks of the greatest flight sim sites.

Flanker 2.0 56

Read about one of the most "hard care" simulations now available: *Flanker 2.0* from SSI.

MIGAlley 56

Last issue we did a preview of MIGAlley, now we'll do a review of this exciting program from Empire Interactive.

Product Reviews 73

Once again we'll take a close look at some of the software and add-ons you may be considering buying: *Intercept Trainer 2000, German Airports 3, Geneva 2000, The Legendary Aircraft Collection* and *Creatools*.

About the cover...
Matt Ridgway designed the cover for this issue.

The image of Patty Wagstaff and the image of her BF Goodrich Aerospace Extra 300 on the cover are used courtesy of Patty Wagstaff Air Shows, Inc.

Image of Patty Wagstaff on this page courtesy of Patty Wagstaff Air Shows, Inc.

NOTAMS: New Products

Jane's F/A 18

Developed in cooperation with the United States Navy, Jane's *F/A-18* claims to capture all the spine-tingling emotion, gut-wrenching excitement and heart-pounding glory of commanding one of most powerful carrier strike fighters in the world — F/A-18E Super Hornet.

Early versions of the *F/A-18*, launched from carriers in the Red Sea and Persian Gulf, decimated Iraqi positions in Operation Desert Storm.

Featuring a bigger weapons load, faster top speeds, a stealthier radar signature and countless technological advancements over its predecessors, the F/A-18 Super Hornet will lead US carrier-launched air assaults well into the new millenium. *F/A-18* brings the experience of being a U.S. Navy pilot to life on your PC.

Features

- Intense carrier deck flight operations
- Advanced weapons platforms
- New graphics and terrain engine
- Intense carrier operations
- Amazing Cockpit Realism
- F/A-18's Complete Air Campaign
- You customize everything from squadrons to pilots to tail art on your aircraft
- Besides the campaign, virtual F/A-18 pilots can enter quick instant-action scenarios or build their own war with F/A-18's powerful mission editor.
- Multi-player performance.

Jane's F/A 18	Jane's / Electronic Arts 209 Redwood Shores Parkway Redwood City CA 94065-1175 Internet: http://www.janes.ea.com/ SRP: $39.95

For those of you who aren't familiar with the term, NOTAMs is an acronym for NOTices to AirMen. The U.S. Government issues NOTAMs regularly. This issue of Full Throttle includes our version of NOTAMS — an expanded new products section. It's a regular part of our magazine. The products listed are compiled from press releases and information provided by the respective authors and companies who supply the products. We've taken steps to verify the information with each author or company, but cannot be responsible for inaccurate features, specification or availability dates.

SureCheck

Real time checklists

Flight Simulators, such as *FS 2000*, are becoming more accurate. To fly a plane just as accurately, you need procedures and numbers. *SureCheck* provides real time checklists to help you fly by the numbers.

SureCheck makes model specific checklists as well as rating lists in case you want to practice the practical standards necessary to achieve different ratings anywhere from Private Pilot to ATP.

Whether you're flying a real aircraft, practicing procedures at home or wanting your sim experience to be accurate, *SureCheck* has the checklists you need.

- Full version checklists
- Pro version checklists
- Rating checklists
- Aircraft reference manuals
- Clearance pads
- V-speed book
- Flightplanner
- Preflight Pad
- Flight handbook

SureCheck	SureCheck 2840 Hillsboro Court Carlsbad, California 92008 Phone: 1-888-340-8055 Internet: http://www.surecheckaviation.com/ E-mail: sales@surecheckaviation.com

Flight Simulator Strategy Guide

Official Strategies & Secrets

Sybex is proud to publish *Microsoft Flight Simulator 2000 Official Strategies & Secrets*. This official strategy guide was written by Ben Chiu, with chapters by Bruce Williams, FS2000 team, and Bill Hoscheit. *Microsoft Flight Simulator 2000 Official Strategies & Secrets* includes:

- Step-by-step instructions designed to complement the simulation's manual by covering often overlooked aspects of flight operations, from creating basic fight plans to supersonic flight procedures and Category III instrument approaches.
- Tutorial flight plans prepared by private, commercial and airline transport pilots.
- Advice on how to use Flight Simulator as a real-world training tool, from Microsoft's Bruce Williams.
- Tips and strategies to help you extend your Flight Simulator experience.
- Aircraft-specific performance charts and aeronautical charts including U.S. airport approach plates.

It also includes a full-color map to help you navigate the skies of *Flight Simulator 2000*.

Microsoft Flight Simulator Strategy Guide	Sybex, Inc. 1151 Marina Village Parkway Alameda, CA 94501 Phone: 510-523-8233 Internet: http://www.sybex.com E-mail: info@sybex.com SRP: $19.99 U.S.

FS 2000 Update Info

Since the release of *Flight Simulator 2000* in October, Microsoft has received positive response from users around the world.

The development team has been closely monitoring the Flight Simulator newsgroups, websites, and forums to determine what users are experiencing with the program.

From these sources and e-mails from Flight Simulator fans, they have addressed several important issues that will enhance the core product.

Check the FS 2000 website (http://www.microsoft.com/games/fs2000/downloads_fsupdate.htm) for more information.

Fly! Airliner Series 757

Precision Manuals has been working hard the past three months developing their latest product called *Fly Series 757*.

The PMDG *Fly Series 757* claims a realistic simulated flight experience of a heavy commercial for Fly! From pre-flight planning to shut-down, you'll be doing the same thing the real pilots do. Every switch, knob and lever is represented in *Fly Series 757*, and must be properly used to operate the aircraft safely. However, if you want to simply "take off," automatic engine/system startup and simplified avionics modes are available.

Features

- Highly detailed 3-D aircraft model of the 757-200ER with full moving parts (accurate to within 1 inch of actual aircraft dimensions).
- Realistic flight model matching actual specs & performance figures.
- Completely new panels and aircraft systems that closely match the real 757 Realistic sound effects.
- Six airline liveries from which to choose with photorealistic exterior graphics.
- Photorealistic cockpit and interior views.
- The 45-page Aircraft Operating Manual contains the detailed technical information you need to plan your flights and operate your aircraft "by the book."

  This information includes performance figures, charts, graphs, checklists and more and explains every aspect of the 757 in a very simple manner so both beginners and experts can learn the required systems and procedures to operate the 757 safely.
- Ten new Fly Now scenarios to use for flight training or as challenging adventures.

Fly Series 757	Precision Manuals Development Group Internet: http://www.precisionmanuals.com/ SRP: $29.95

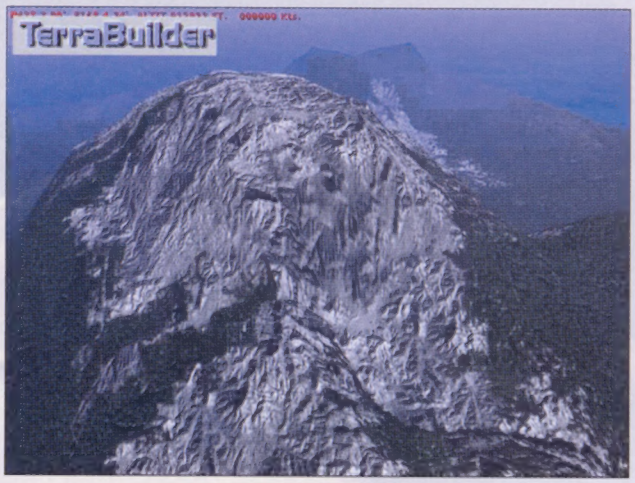
TerraBuilder 2

Scenery Terrain Generator

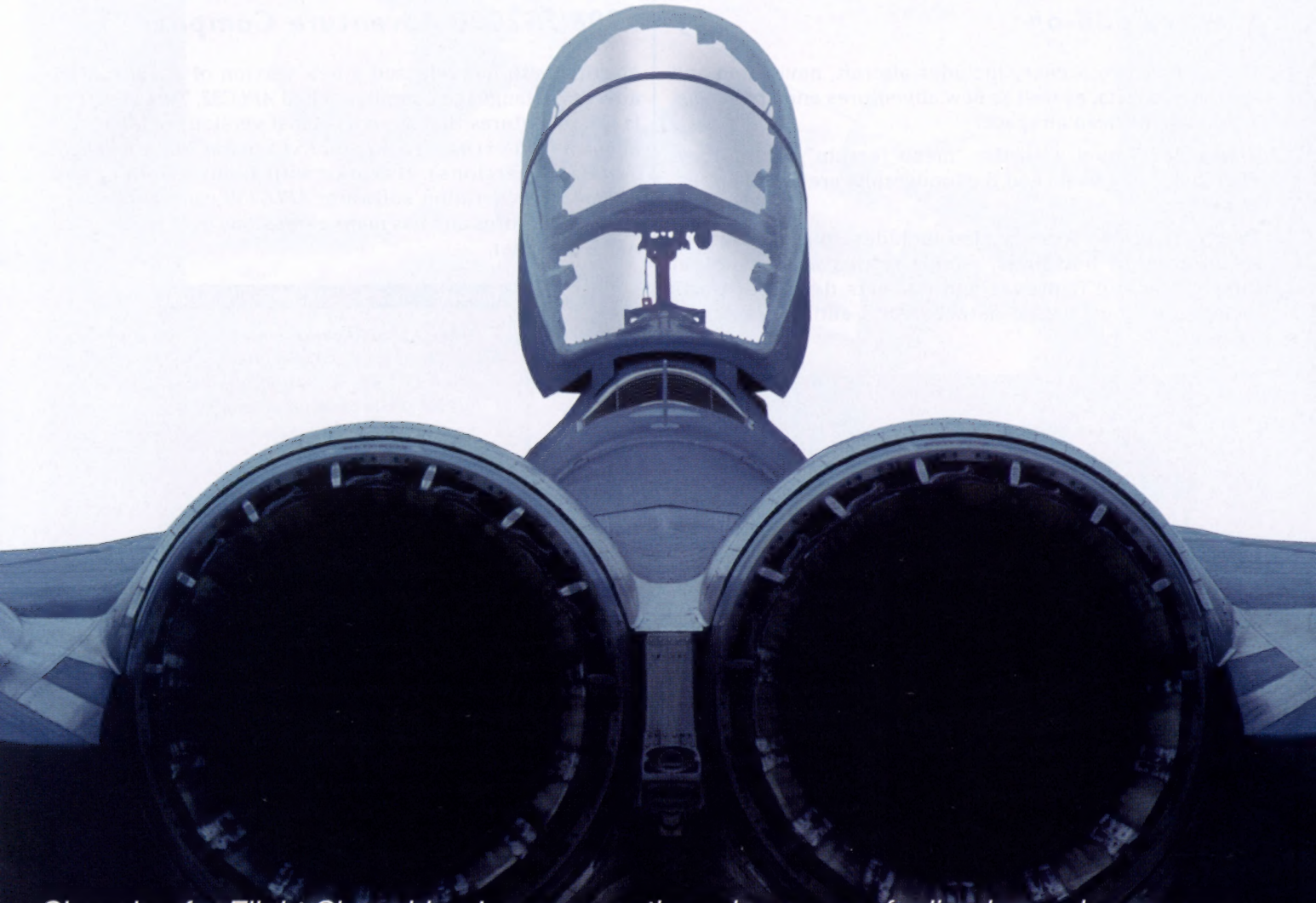
SynthWizard is an all-new *TerraBuilder 2's* automated mesh terrain generator that uses *CombatFlight Simulator* textures and derived custom textures to generate seamless synthetic terrain at two meters per pixel.

There are nine landscape types that you can arrange into a terrain mosaic of unlimited variations. Also, SynthWizard scans the supplied altitude map and "stratifies" the landscape types according to the altitude limits that you set.

TerraBuilder 2
Author: Misho Katulic Internet: http://members.xoom.com/terrabuilder/index.htm Price: $33.00



So, you in or out?



Shopping for Flight Sim add-on's can sometimes leave you feeling burned, or worse. That's why at ***Afterburner****, we've been working with some of the finest programmers in the flight sim world to bring you only licensed, fully authorized versions of the best software, directly from the authors themselves. And because it's from the editors of* ***Full Throttle****, you'll know each CD is filled with the kind of software every flight simmer is hungry for. Things like* ***New Scenery****,* ***New Aircraft*** *&* ***Panels****,* ***Utilities****,* ***Demos*** *and more all for less than* ***$10 per CD****!*

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E Mail: sales@ftmagazine.com

Mexico Gold Pro

Scenery add-on

Mexico Gold Pro Scenery includes aircraft, navigation and approach charts, as well as new adventures and challenges inside the Mexican airspace.

It was developed with the "mesh terrain" technology. Therefore, the terrain and the topography are based on real elevations.

Mexico Gold Pro Scenery also includes "photo-realistic" technology in buildings, ramps, cities and principal topography and improves and corrects default airports included in the *FS 2000* database and adds the missing navaids.

Features

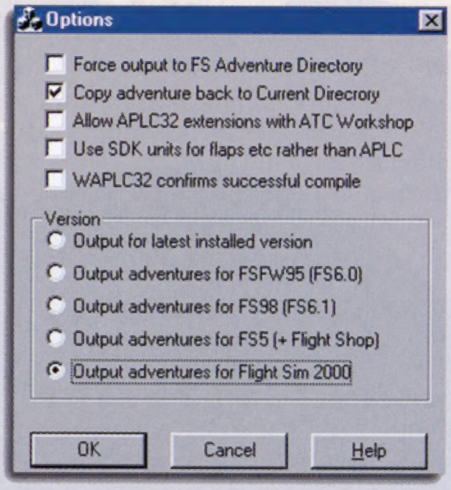
- Navigation and approach charts in each volume for a total of more then 70 charts for all the country
- Improves and corrects 48 Mexican airports in Volume I and it includes 52 enhanced Mexican and south us airports
- Photo-realistic terminal buildings, taxiways and ramps
- Runway and taxiway lighting that complies with international standards
- Virtually every signaling detail available in Mexican airports
- Intelligent air and ground traffic, inside terminal areas, airports and enroute.
- Photorealistic detailed main cities
- New classic aircraft popular in the Mexican aviation Golden age: Comet 4, Hercules, Northrop F-5E, DC-8-61, DC-3, T-33, DC-4, DC-7, Boeing 247, and more recent models like the DC-10, F-100, B-757 and A320
- New challenges and fun adventures included

Mexico Gold PRO
Flymex Internet: http://www.flymex.com.mx/mexicopro1eng.htm Available dealer list: http://www.flymex.com.mx/distribuidores.html SRP: $26.99

APLC130

FS98/FS2000 Adventure Compiler

Martin Smith has released a new version of his advanced adventure language compiler called *APLC32*. This compiler is for adventures that supports most versions of Microsoft *Flight Simulator* (from *FS 5.1* and *FS FS* to the Windows *Flight Simulator* versions). It works with flight planning and adventure generation software. *APLC130* can handle very large adventures and has many extensions over the original APLC compiler.


Options
Force output to FS Adventure Directory
Copy adventure back to Current Direcrory
Allow APLC32 extensions with ATC Workshop
Use SDK units for flaps etc rather than APLC
WAPLC32 confirms successful compile
Version
Output for latest installed version
Output adventures for FSFW95 (FS6.0)
Output adventures for FS98 (FS6.1)
Output adventures for FS5 (+ Flight Shop)
Output adventures for Flight Sim 2000
OK
Cancel
Help

AutoMETAR
Author: Martin Smith E-mail: martin@sharrow.demon.co.uk Download: http://www.flight-sim.iup.edu/files/uploads/aplc130.zip Freeware

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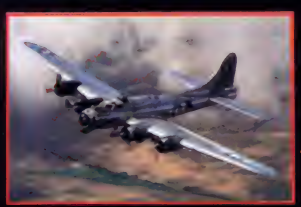

B-17G "FLYING FORTRESS"

A6M "ZEROS", D3A "VALS", B5N "KATES"

P-40E "KITTY HAWK"

SBD "DAUNTLESS", SB2C "HELLDIVER"

DH82A "TIGER MOTH"

"BLENHEIM" Mk.IVT, "LYSANDER" Mk.IIIA

B-26 "MARAUDER"

Amsterdam 2000

Scenery

H.J. Mueller, author of the popular *Zurich 98* and *Zurich 2000*, has released his latest workings of *Amsterdam 2000*. As its name suggests, *Amsterdam 2000* is developed specifically for *FS 2000* users. Its scenery lets you fly the Amsterdam areas in much higher detail in *FS 2000*.

Features:

- Designed specifically for *FS 2000*
- Runways and navaids
- Taxiways
- Traffic roads
- All buildings, including freight and hangars, feature *FS2000* style night lighting
- Gate facilities of all terminals
- Lighted taxilines and taxiways
- Lighted aprons
- Static aircraft at the piers
- Docking systems at all piers
- Taxiway signs

Amsterdam 2000	Mueller Hansjoerg Waldeggstrasse 20 8405 Winterthur Switzerland Internet: http://flightsim.friends.ch/index_e.htm E-mail: flightsim@friends.ch SRP: $25.00

Rain

FS 2000 Raindrop Enhancement

Raindrop is a small replacement BMP file that corrects two aspects of the default rain in *FS2000*. It corrects raindrops to look more normal in color and from a pilot's perspective to windshield distance.

Rain	Author: Frank Maetzler Download: www.flightsim.com Filename: rain.zip Freeware

Hands On Throttle And Stick Support (H.O.T.A.S.S.)

If you're still flying with your joystick on your table then you might want to consider Hands On Throttle And Stick Support (H.O.T.A.S.S.). The new HOTASS Control Positioner instantly turns your home computer into a cockpit.

Modern fighters rely on Hands on Throttle and Stick (H.O.T.A.S.) to control weapons systems. Fighter Systems has created H.O.T.A.S.S. (Hands On Throttle And Stick Support) to place stick and throttle in the same position as in today's fighters. You'll discover that placing the joystick between your legs or on your right is the most natural position for maximum flight control.

Hands On Throttle And Stick Support (H.O.T.A.S.S.)	FighterSystems 7841 Alabama Ave. Unit 1 Canoga Park, CA 91304 Phone: 888-287-8060 Internet: http://www.fightersystems.com/

RTS Pro

Radionavigation Training Simulator

Virtual Application unveils another contender in the IFR training arena.

VA claims: "RTS is programmed by IFR pilots, intended for virtual or real pilots who want serious training and practice. RTS Pro is a complete, precise and realistic simulator modeling two very popular models: the Beechcraft Bonanza A36 and the Baron 58."

Features

- Photo-realistic panel of the Beech Bonanza A36 (single engine) and the Baron 58 (twin engines)
- Fully interactive switches and control knobs
- Audio selection panel with markers beacons
- Two VHF receivers com/nav KX 155s
- European database (North America, Japan and Australia will be soon available)
- Navigation database editor
- Realistic engine, gear, flap and beacon sounds

- ATC environment (vocal ATIS)
- Programmed or random system failures
- Static or dynamic weather module
- Compatibility with all yokes and rudders
- Map mode (runways, beacons, intersections, and low airways)
- Plan and profile view
- Recording functions
- Practice all types of instrument approaches (ILS, LOC, DME, NDB, VOR, backcourse, holding)
- Conceived for professional, private or virtual pilots
- 3-D environment (management of the crash detection on ground, mountains)
- Intuitive controls interface

RTS Pro	Virtual Application Internet: http://www.rtspro.com/ E-mail: infos@rtspro.com SRP: $299.00

Fly! 172 IFR Panel

Users of Terminal Reality's *Fly!* now have the option of flying the 172 with a fully functional IFR panel. This works for both Mac and PC versions of *Fly!*

TRI claims that "*Fly!* will normally default to displaying 'VFR' cockpit panels for each aircraft. This installation will add an additional cockpit for the Skyhawk 172R that you may find more suitable for doing Instrument Flight Rules (IFR) flight.This trades accuracy in layout of the original manufacturer's panel to having more closely positioned gauges of much higher resolution."

They recommend using the 1.01.83 version of *Fly!*

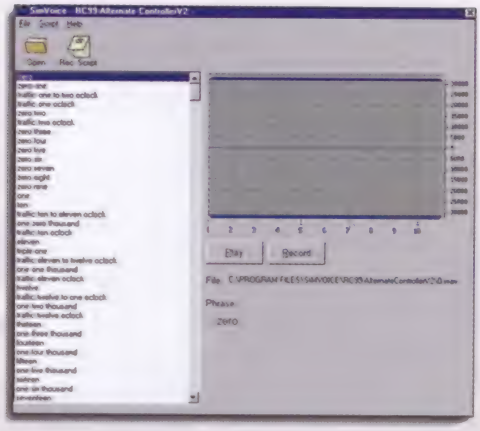
Fly! 172 IFR Panel
http://www.avsim.com/cgi-bin/library/jump.cgi?ID=3627 Free Download

SimVoice

SimVoice is a voice script utility that makes it easy for users of simulator products to record their own voices in products like *Radar Contact 99*, *ProFlight*, and *Fly VFR2*. By using the registered version, you can create scripts to support any simulation product that uses prerecorded phrases stored in individual files.

SimVoice walks the user through all the steps to setup their recording hardware, record each phrase in the script and save the resulting phrase files with the correct file names.

Scripts can be recorded much faster, and the resulting files will have the correct volume and be trimmed of excess gaps.



SimVoice	Author: Kirby W. Angell Internet: http://jpython.dhs.org/simvoice/ E-mail: kwangell@msn.com Price: $19.00

FSUIPC

Interfacing Module for FS 2000

Many popular add-ons for Microsoft's Flight Simulator have relied on Adam Szofran's FS6IPC to acquire valuable data from within the program. Many users had found that FS6IPC no longer worked with FS 2000. FSUIPC.DLL is a module for FS 98 or FS 2000 that accomplishes the same sort of work as Adam Szofran's popular FS6IPC.DLL, but it also adds the following additional facilities when used with FS 2000:

Obtains some information, such as ambient wind details, jet EPR and Fuel Flow, which is not otherwise available in the FS 2000 globals.

Provides operating analogue inputs to FS 2000 from locations for throttles, propeller pitch and fuel mixture, which otherwise don't occur in FS 2000 because the data there is not acted upon when changed.

Constructs weather data structures for FS 2000's weather engine from FS 98-style weather details placed into the old FS 98 global weather positions. This allows *Real Weather* and *SquawkBox* to control the FS 2000 weather as they did in FS 98.

FSUIPC
Author: Peter Dowson E-mail: pete@millhays.demon.co.uk Download: http://www.flight-sim.iup.edu/files/uploads/aplc130.zip Freeware

Pacific Combat Pilot

CFS Add-on Package

The Associates have just released their eagerly anticipated CFS add-on program called *Pacific Combat Pilot*. It contains photorealistic scenery of the northwest Pacific Islands of Guam, Saipan, Tinian and Rota. *Pacific Combat Pilot* revisits the settings of some of the most desperate aerial battles in the Pacific.

Fly from carriers on daring missions or relive the fateful Pearl Harbor attack, Recreate history in the role of Allied or Japanese aviators.

Pacific Combat Pilot includes the following features:

- Aircraft features moving parts
- Custom panels
- Photorealistic scenery of the northwest Pacific Islands
- Full quick Combat facility for all the aircraft
- Landable aircraft carriers
- 20 new missions arranged in two campaigns

Pacific Combat Pilot	Interactive Associates (CDC) Ltd. Units A2/A3 Edison Road, St. Ives, Cambridgeshire PE17 4LF, UK. Internet: www.flightsim.co.uk SRP: $40.00

SIMCHARTS

by JEPPESEN

GREAT FEATURES:

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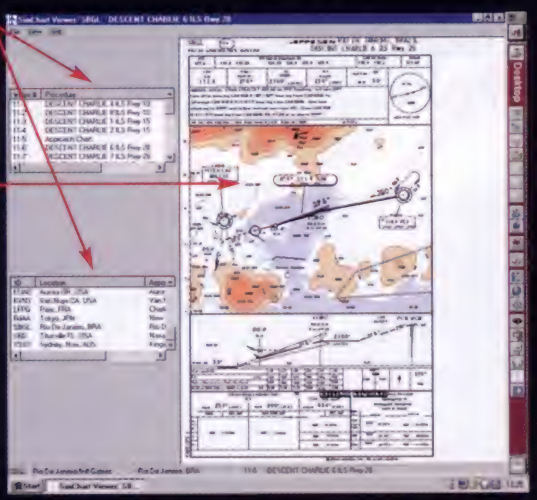

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Patty Wagstaff has flown airshows and competitions in North America, South America, Europe and even Russia. She performs in aerial exhibitions before millions of spectators each year. Her breath-taking low-level airshow performances give spectators a front row seat view of the precision and complexity of unlimited aerobatics.

Read about how she performs her aerobatic manuevers and what makes her a top draw at airshows everywhere.

Full Throttle Interviews

Patty Wagstaff

Photo courtesy Patty Wagstaff Air Shows Inc.

Full Throttle Interviews Patty Wagstaff

Patty Wagstaff is known worldwide for her unique style and precision routines. Patty flies these low-level routines before millions of spectators each year and has become a household name among the greatest performers working the airshows today.

Have you ever flown the Extra 300 in Microsoft's Flight Simulator? That's Patty's plane. If you look hard enough in FS 2000, you'll even see Patty inside the Extra 300. However, she is much prettier in real life, of course.

What's a pretty little gal from Florida doing in a highly competitive, male dominated sport that wrenches the guts out of any macho man? The answer is simple: Showing them how it's done.

Interviewed by Jim Rhoads

Forget the fact that she is a six-time U.S. Aerobatic Champion, three-time U.S. National Aerobatic champion and six-time recipient of the Betty Skeleton Award as the "First Lady of Aerobatics." She has also won gold, silver and bronze medals in international aerobatic competition and has trained with the Russian Aerobatic Team. She continues to coach aerobatics competitors from around the world.

Don't think for a moment that Patty isn't a very busy person, even in the off-season in sunny Florida. Patty occupies the off season flying as a stunt pilot and aerial coordinator for major motion picture and television projects and instructs pilots in the military T-6A Texan II.

Is she a control freak? Yeah, maybe. And I bet she would agree. Anyone who has watched Patty perform can attest to her incredible attention and obvious desire to absolutely and completely control her environment. Precision, complexity and challenge are what this lady is all about.

Full Throttle hooked up with Patty at the Oshkosh AirVenture, where she had agreed to tell us about aerobatics and much more.

FT: Hi Patty. Where is your home airport these days?

PW: St. Augustine, Florida.

FT: I believe you used to be located in Tucson, Arizona, is that correct?

PW: Yes, in fact the aerobatics videos that are in Flight Sim were done there

FT: How many records do you hold at this time?

PW: Well, I don't know if I really hold any records, but I have won the U.S. National Aerobatic Championship three times, and I was the first woman to do it. As well as gold, silver and bronze medals in competition

FT: How did you get interested in flying?

PW: Well, I have been around it all of my life. I also lived in Alaska, where aviation is very common, and it seems like everyone there flies. It was basically through exposure and opportunity.

FT: Do you remember your first airplane ride or the plane in which you soloed?

PW: Yeah, sure. The first real flight in a small aircraft was in a Cessna 185 with my ex-husband in Anchorage, Alaska, out of Lake Hood on floats. And the plane I soloed in was a Beech Sport, at an airport called Birchwood out of Anchorage a couple days before my 29th birthday.

FT: Does anyone else in your family fly?

PW: Yes, my sister is an airline pilot and flies a 757 for Continental, and my father is a retired 747 airline pilot, bush pilot and cargo pilot in the Caribbean having flown DC 6 and DC-7s.

FT: Did you ever instruct or have you ever taught anyone else to fly?

PW: Oh yeah, I have a lot, and that's how I got started in Alaska - teaching bush flying and that sort of thing.

Photo courtesy Patty Wagstaff Air Shows Inc.

I still do. I don't instruct a lot now, although I do enjoy it. I like instructing people that take it seriously.

I want to instruct people that want to learn more about aerobatics and are not just wanting to go up for a thrill ride.

FT: Is there any airplane that you have always wanted to fly but haven't?

PW: Well, I would like to fly the space shuttle <grinning> or maybe the F-15. I guess I would like to fly bigger, faster jets... like maybe the F-22 and the shuttle.

FT: Can't argue that. What is your favorite airport to perform at?

PW: Oshkosh.

FT: Have you ever had any emergencies or off-airport landings?

PW: No. I have never have had an off-airport landing. And of course, I have had plenty of emergencies but always made it back to the airport. I guess I have been lucky, and the majority of my training is over the airport.

FT: Have you ever considered flying for an airline?

PW: No. Not at all. It just isn't me. I grew up around the airlines and as I stated earlier, my father flew for the airlines.

I consider that my talents and interests are in aerobatics. I suppose that if it were the only way I could fly, then sure.

FT: Well, I understand that you have a new Extra 300 this year.

PW: Yes, it is the one you saw at Oshkosh this year.

FT: Who gets the old one?

PW: I don't know. I suppose whoever offers the right price. Aerosport traded me on the new one, so they own it now.

FT: What started your interest in competitive aerobatics?

PW: That was what I was interested in from the beginning, really. I flew my first show before I flew my first contest.

To me it was what I was really looking for. Something that would keep me interested for a long time, something that I didn't think I would get bored with and something that would challenge me.

Photo courtesy Patty Wagstaff Air Shows Inc.

FT: Obviously, you picked the right thing.

PW: Yes, absolutely. I have been doing it for quite a while now, but even now I can learn something new. I still train and still even have a trainer.

FT: What is your personal favorite maneuver?

PW: Probably the hammerhead. I really like precision maneuvers.

Although I do go up and do tumbles, I feel like anybody can go up and tumble the plane. But to do the really good precision maneuvers, to me that's where the real challenge is and that is what I love.

FT: What's the largest crowd you have ever performed for?

PW: Probably El Toro a couple of years ago. Over the weekend they had over two-and-a-half-million people.

Oshkosh is enormous too, but I think El Toro was bigger.

FT: Does anything scare Patty Wagstaff?

PW: Yeah. I don't like to be afraid. So basically fear itself scares me, and I do everything I can to avoid it. I have always been like that. I am not reckless. I know that what I do has a certain element of risk to it and I have to be extremely careful and there is very little room for error.

FT: Who do you admire most in aviation?

PW: I really admire Bob Hoover a lot for all kinds of different reasons. One is his graciousness. I was at Oshkosh a couple of years ago and it was right when he got his license back. And of course we all know that the FAA didn't do him any favors. Bob was there and I was sitting beside an FAA person at the show. Bob Hoover walked up and shook his hand and treated him as nicely as he did anyone else there. And I thought if I could only be like that, and be that kind of gracious person, I would feel very lucky. I really admire him.

FT: What can we expect to see from Patty Wagstaff in the future, and have you set any goals of any kind?

PW: Well, other than wanting to go up in the Space Shuttle - I am serious.

FT: <laughing> Yes, I know you are, and that is one heck of a goal.

PW: What I would like to do is continue to demonstrate the Texan II for Raytheon in the next couple of years to come and maybe demo that at some of the military bases where it is going to be delivered. And I would like to demo other planes like that for other big companies. I want to continue to fly and be challenged when I fly and that's when I feel like I am at my best. I would also like to have some students that go on. I have a student right now, and her name is Susan Dodson. She is going to fly airshows this next year. She is going to start out flying in my plane, and I am really excited because we need more women doing this. Susan has all of the ingredients except an airplane. I would like to have other people over the years that I can help get into the business.

FT: Of course, many people know that your plane is in Microsoft's Flight Simulator. How did that come about?

PW: Well, I was involved in a CD-ROM named "World of Flight"; it was sort of a tour of aviation.

Extra 300 S Specifications Sheet			
Specifications		**Fuel**	
Wingspan	26.3 ft.	Total Capacity, Standard Tanks	45.1 gals.
Length	21.8 ft	Useable Fuel, Standard Tanks	44.6 gals.
Height	8.6 ft.	**Weight**	
Wing Area	112.4 sq. ft.	Empty Weight	1,440 lbs.
FAA Certified Load Factor	+/- 10 g	MTOW-Normal Category	2,028 lbs.
Engine	Lycoming AEIO-540-L1B5	MTOW-Single Pilot Acro	1,808 lbs.
Horsepower	300 HP	**Range**	
Propeller	MT 3 blade, constant speed	Standard Tanks @ 8,000 ft, 170 Kts. TAS	415 NM (with 45 minutes reserve @ 45% power)
Airspeeds		**Performance**	
Never Exceed Speed (Vne)	220 kts.	T/O Roll (2,028 lbs. @ SL)	315 ft.
Maneuvering Speed (Va)	158 kts.	T/O Over 50 ft (2,028 lbs. @ SL)	679 ft.
Stall Speed @ 1,808 lbs	55 kts.	Max. Rate of Climb (1,654 lbs. @ SL)	3,200 fpm
Stall Speed @ 2,028 lbs	59 kts.	Max. Rate of Climb (2,028 lbs.@ SL)	2,350 fpm
		Cruise (4000 ft. @ 75% Power)	170 kts.

Standard Equipment			
Flight Control System		**Engine Instruments**	
❖	Stall warning system	❖	Digital tachometer
❖	Toe brakes	❖	Manifold pressure/Fuel flow
❖	Elevator trim system	❖	Oil pressure/Oil temperature
❖	Steerable tailwheel	❖	CHT/EGT
Engine and Propeller		**Flight Instuments**	
❖	Lycoming AEIO-540-L1B5	❖	Altimeter
❖	MT 3-blade, constant speed	❖	Airspeed indicator
Electrical System		❖	G-meter (analog)
❖	Sealed 12V battery	❖	Magnetic compass
❖	Ammeter	**Flight Crew Equipment**	
❖	Lightweight starter & alternator	❖	Adjustable composite seat
❖	Wingtip strobes/Navigation lights	❖	Hooker 5 point harness
Fuel		❖	Hooker ratchet system
❖	45.1 gallons	❖	Adjustable rudder pedals
❖	Electric boost pump	**Paint Design and Colors**	
❖	Fuel gauges - wing & acro tanks	❖	Interior: textured finish to buyer's specs from available colors
		❖	Exterior: three designs with choice of three certified colors

After I did that, Microsoft contacted me and wanted me to become involved in Flight Sim. That's how it came about. They decided to use my name and airplane in the product.

FT: How would you say the Extra 300 simulator model (FS 2000) performs in respect to your real plane?

PW: Actually, very well. I worked with them on it and I am really pleased with it.

You may not be able to fly Patty's Extra 300 in real world aerobatic competition but you can fly her Extra 300 in FS 2000...see the *Aerobatic Maneuvers in FS* article on page 20 for more information.

FT: Simulators have advanced rapidly in the last few years. What kind of benefits do you see flight simulation has for pilots?

PW: It has huge benefits, not only to pilots but to non-pilots as well. I get lots of e-mails and people that come up to me all of the

T-6A Texan II Spec Sheet		
Performance	U.S.	Metric
Maximum speed low level	270 KIAS	500 KM/HR IAS
Maximum speed at altitude	310 KIAS	575 KM/HR IAS
Maximum range at altitude	850 NM	1575 KM
Final approach speed	100 KIAS	185 KM/HR IAS
Maximum cruising altitude	35,000 FT	10,668 M
Engine: One Pratt Whitney PT6A-68 Turboprop	1,100 SHP	820 KW
Field performance (Safe student training margins on runway)	4,000 FT	1,219 M

Specifications	
Pressurization	Yes
Aerobatic	Full
Seating configuration	Stepped Tandom
Minimum aircrew	Two
G-limits	+7 to - 3 5 g
Anti-G system	Yes
Avionics	All Digital
Birdstrike (4 lbs)	No cockpit penetration at 270 KTAS
Refuel	Single point and over wing

Patty's Resume	
1997	Recipient NAA Paul Tissiander Diploma
1997	Inductee, Woman in Aviation International Hall of fame
1997	Inductee, Arizona Aviation Hall of Fame
1996	Recipient, Charlie Hillard Trophy
1996	GAN and Flyers Readers Choice Award – Favorite Female Performer
1996	Top Scoring U.S. Pilot at World Aerobatic Championships
1991, 1992, 1993	U.S National Aerobatic Champion
1993	International Aerobatic Club Champion
1985-1996	Member , U.S. Aerobatic Team
1990, 1992, 1994	Top U.S. Medal Winner, World Aerobatic Championships
1995	Recipient, ICAS Sword of Excellence Award
1994	National Air and Space Museum Award for Current Achievement
1994	NAA Certificate of Honor
1993	EAA Major Achievement Award
1991	Voted Western Flyer Readers Choice Favorite Airshow Performer
1988 – 1994	Winner of Betty Skelton "First lady of Aerobatics" Trophy
1987	Rolly Cole Memorial Award for contributions to Sport Aerobatics

time and say that they learned to fly on Flight Sim or that they know how the controls work or they're going to be a pilot because of Flight Sim. I think it is a great training tool. And that is one thing that Microsoft is working on is moving in the direction to a training tool as well as entertainment, working with people like Flight Safety, AOPA and others.

FT: What would you say to anyone who is interested in a career as an aerobatic pilot?

PW: Unless you have unlimited recourses, get another job first. Become a business man or a doctor or a lawyer, or whatever you might do and then do it on the side. Because to get out there and start out and make a living, get a sponsor and so on, it is very hard to do. It's kind of like the chicken and the egg thing. Which comes first?

You have to have a reputation to get a sponsor; to get a reputation it takes a lot of money to get there. So get everything else in line first.

Don't forget to check out Patty's official website for current information, video clips, photos and more.

http://www.pattywagstaff.com/

The other thing is, at least for most people, is that you should compete. At least get around competition people, even if you don't want win the nationals or be on the world championship team. It gives you a good sense of discipline and a good background and a safe way to learn.

Patty Wagstaff is undoubtedly one of the most demanding competition/aerobatic performers in the circuit today.

Whether performing graceful, artistic airshow manuevers or in the heat of fierce competitive aerobatics, Patty Wagstaff seems to be in control of her environment. It seems like the tougher it gets, the better she is.

Competition aerobatics is a tough business that requires an enormous amount of time, sacrifice and money. In a business that from the outward appearance looks so easy and is the envy of many, it's obvious that Patty Wagstaff has earned her wings and continues to do so. *Full Throttle* magazine would like to thank Patty for her generous contributions not only to this article, but to all of the people that she inspires and influences in real-world as well as virtual aviation.

Hillary may be the First Lady of the White House, but Patty Wagstaff earns the same title doing her work out of a 3' x 5' office with a lot more unusual attitudes. We wish Patty the best and safest for the year 2000 and beyond.

Aerobatic Maneuvers in FS

Do you think that Patty Wagstaff has an easy career simply flying around the country and performing aerobatics at different airports? Don't be fooled...you may be surprised by the precision and difficulty involved in these aerobatic maneuvers.

You won't need great physical strength to perform aerobatics. However, you'll be tested on your skill, coordination, finesse and knowledge on how your airplane handles. You need to make split second decisions to execute the maneuvers successfully while facing disorienting visuals, eardrum rattling engine roar, a changing environment and G-forces that can cause you to black out. You also must always be aware of where you are in the "aerobatic box," the sequence you are flying, the traffic that may wander into your flight area and definitely where the ground is at all times.

If you think you can handle it, try it yourself. In this article we'll look at a few examples of aerobatics you can perform in FS 2000 and FS 98. We'll even use the same airplane that Patty flies in her shows — the Extra 300.

You'll need to load in the Extra 300S in your version of Flight Simulator. To do this in FS 2000 and FS 98, choose the **Aircraft | Select Aircraft...** command in the menu bar. Then select the "Extra 300S from the list of available aircraft. Before performing aerobatics, make certain you're familiar with the Extra 300S, especially with the joystick as controller. Until you're comfortable and recognize how the Extra reacts to your stick (and how the joystick reacts to the Extra), practice by watching from the Spot plane in FS 98 or FS 2000. (Select the **Views | View Options...** command and the "Spot plane" button for Window type.) You may also want to try other settings by selecting the **Views | View Options...** command. For example, I set the "Distance" at 100 feet, "Zoom" at 1 and Fixed for the "Transition." I kept the spot plane to the portside of the Extra. It's also a good idea to keep the instrument panel set to "Global" so you can see how the instruments react to your moves (choose View Instruments | Panel and "Global On".) Then do some loops, climbs, etc., and remember how the Extra reacts to how you move the joystick. Don't worry about doing anything fancy at this point but try not to crash.

By Scott Slaughter

Practice aerobatics by watching your maneuvers in Spot view until you're comfortable and recognize how the Extra reacts to your instructions.

Before performing any aerobatic maneuver, make certain to check fuel quantity and fuel tank selector. Also, double-check your engine instructions all read normal. You'll need to keep an eye on four gauges in particular when performing aerobatics in the Extra 300. These are shown in the following 2 images (FS 2000 on top, FS 98 bottom):

Pay particular attention to the G-meter (1), Airspeed Indicator (2), Attitude Indicator (3) and Altimeter (4) when performing your aerobatics.

Before beginning a maneuver, be at least 3000 feet above ground level (a few maneuvers require an even higher minimum altitude).

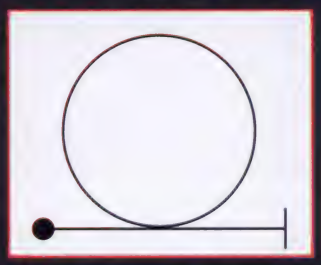
Read the information on the maneuver first before attempting it in Flight Simulator. A good way to understand how the maneuver should look is to study the aresti notation (see page 22 for information on aresti notation).

The first maneuver we'll do is a loop.

Loops

The advantage of learning loops first is that it helps you become familiar with different attitudes, airspeeds and G-forces. These can change very rapidly as you perform a loop. Although flying a loop seems simple and is a basic maneuver, it's not always easy to fly well. You may believe that all there is to do is to get your airplane at the proper airspeed and pull back on the stick. Although this will take your airplane through a 360-degree loop, you won't win many aerobatic competitions flying that way. Instead, you're more likely to stall at the start of the maneuver or lose enough airspeed that you'll fall out of the loop (or worse).

As you can see in the following aresti notation, the loop must be perfectly round and not oval or egg-shaped. Also, the entry into the loop and the exit from the loop must be at the same altitude.

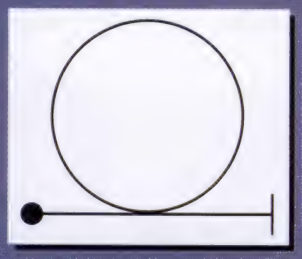


Aresti notation for a loop

A good way to perform your first loop is to line your loop up with a road or very long runway. I used the Grand Haven (Michigan) Municipal Airport as my starting point. A long and straight north-south road runs just west of the airport.

Note On Aerobatic Figures

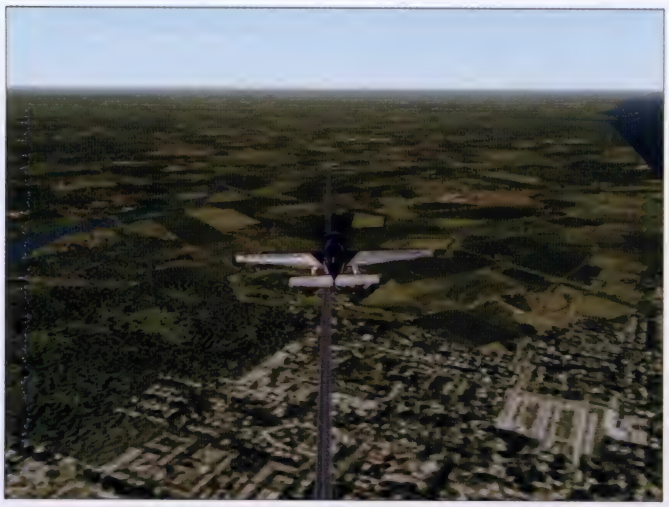
You'll see several diagrams in this article. These diagrams are called aerobatic symbols, aresti aerocryptographics or aresti notation. The diagrams we're using in this article follow the FAI (Federation Aeronautique Internationale) rules for aerobatic figures. (See http://www.fai.org/ for more information on the FAI).



Although the figures may look somewhat complicated, they're simple to understand. All aerobatics figures start and end from horizontal lines in either upright or inverted flight. Notice the small solid circle in the diagram. It represents the starting point of the maneuver. The vertical bar in the diagram represents the end of the maneuver. Any solid lines that appear in the diagram represent upright flight and dashed lines represent inverted flight. Parts of loops may connect these line segments. You might see rolls represented in 1/4, 1/2, 3/4, etc increments (up to two rolls) added to the lines.

Some maneuvers (for example, the Cuban Eight and loops) require that the altitude at which you enter the figure must be the same as when you exit the loop. However, where the entry and exit lines must be the same altitude, the lines in the diagram appear separated slightly so they're easier to see.

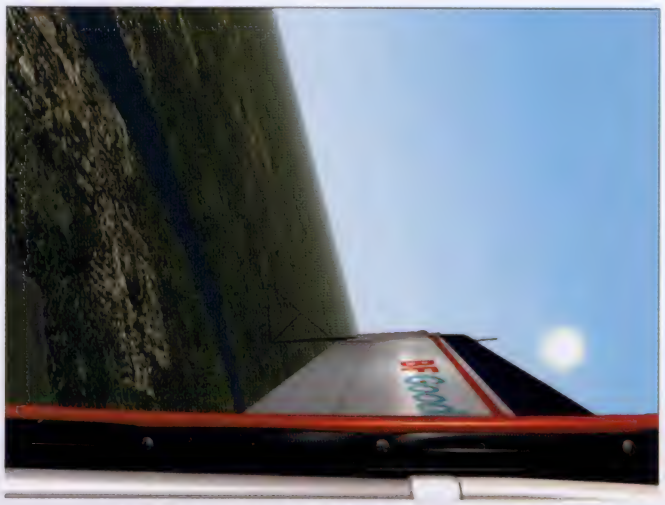
This is only a brief description of aresti symbols so if you want more information on aresti symbols, check this website: http://www.worldaerobatics.com/aresti5/



Try lining up with a road or long runway before beginning a loop.

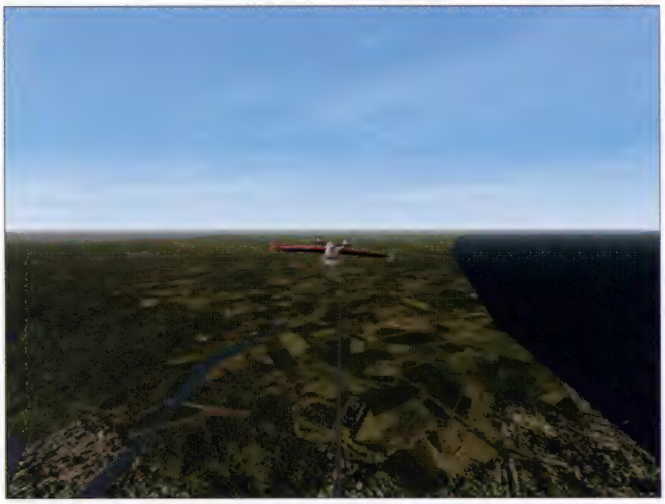
Keep an eye on your airspeed. Adjust your speed so you're flying at about 140 knots in level flight. Then start a smooth consistent pullback on the stick. Watch the G-meter on the panel because you need about 4 Gs to do perform a good loop.

The loop starts with a pull up of 3 to 4 G. Look over the left wing and make certain it creates, or draws, a circle on the horizon (see image to the right). This is very important to completing a successful loop. Adjust the amount of backpressure to keep the wing tip moving in that circle. The reason to look over the left wing is that you won't see anything but sky by looking over the nose at this point of the loop and you need something to reference to complete the loop.



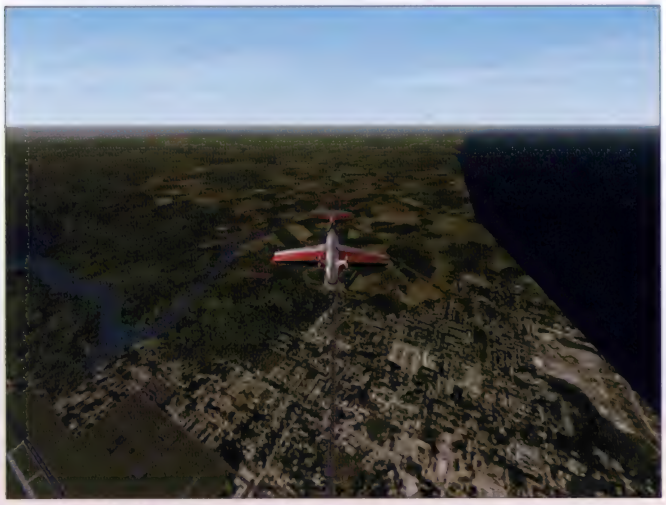
Make certain your left wing forms a circle on the horizon as you execute a loop.

When you're past the vertical, slowly relax the backpressure on the elevator so you're almost "floating" over the top of the loop. This will help round off the loop. Otherwise, if you hold full backpressure on the stick, your loop will be egg shaped and you're likely to stall at the top.



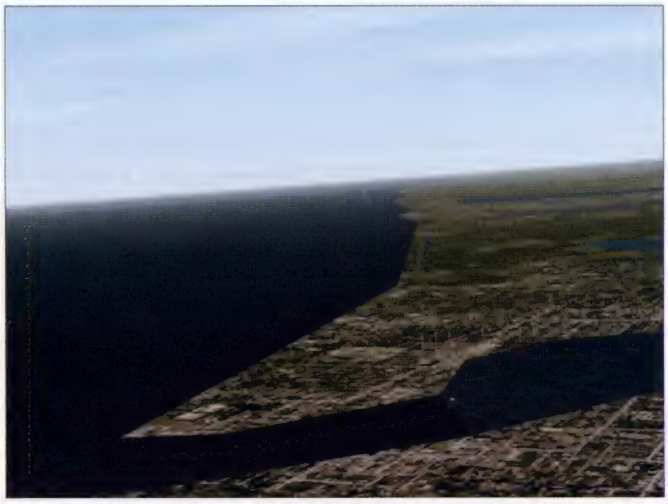
When you're past the vertical, slowly relax the backpressure on the elevator so you're almost "floating" over the top of the loop.

When you've reached the top of the loop, slowly increase the backpressure again throughout the backside until you're flight becomes horizontal. Check airspeed and power throughout the backside because you may need to reduce the throttle. Look over the nose to stay aligned with the reference point (the road in this case), but don't forget to look over the left wing often to see if it's still tracing a perfect circle.



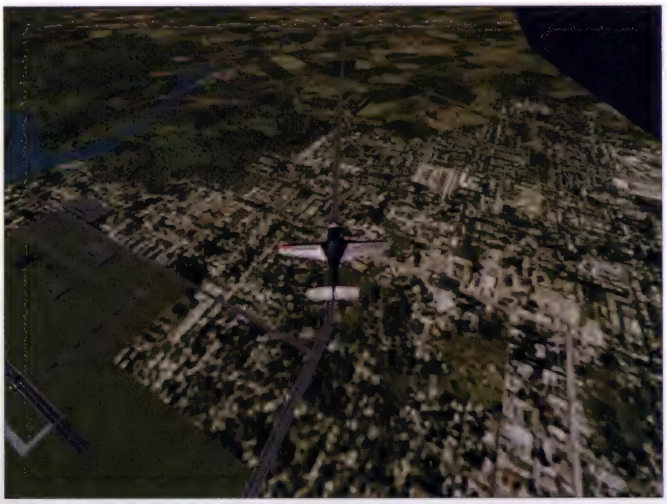
Slowly increase the backpressure throughout the backside until you're flight becomes horizontal.

Make certain the wings remain at right angles to the flight path. Look back over the tail as you pass through the vertical to make sure the wings stay level with the horizon. Use the rudder to maintain the plane of the figure and use the ailerons to maintain the orientation of the wings. Maintain backpressure as the nose comes back to the horizon.



Look back over the tail as you pass through the vertical to make sure the wings stay level with the horizon.

You should pull about 4 Gs at the bottom of a normal loop.



Use the rudder and the ailerons to maintain the orientation of the wings. Maintain backpressure as the nose comes back to the horizon.

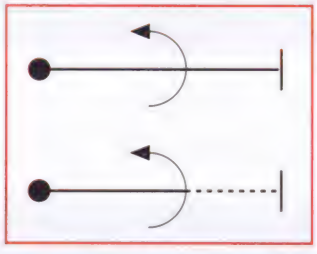
Try this to test your skill

Once you're familiar with the basics of the loop maneuver and want an additional challenge, increase the wind setting and then try a loop maneuver. (If you're

flying in competition, it helps to watch what your competitors are doing so you can judge the effects of the wind when it comes your turn to fly.)

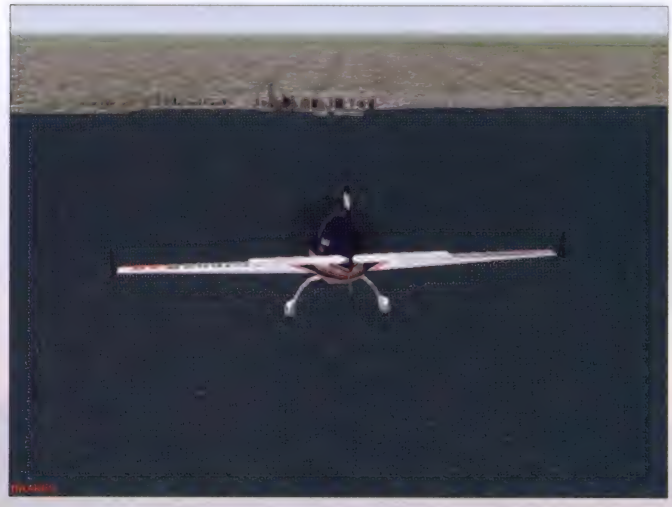
Aileron roll

An aileron roll involves a four-step maneuver. You'll rotate your airplane 360 degrees around its longitudinal axis. However, to do this successfully you must keep the nose following a tight circle around a point on the horizon. Thanks to the brisk roll rate of the Extra 300S, the aileron roll one is an easy aerobatic maneuver to accomplish. As with many aerobatics in the Extra 300S, performing an aileron roll occurs very quickly (its roll rate exceeds 400 degrees per second). The following is the diagram of the roll:



Aresti notation for an aileron roll

Start by selecting a reference point on the horizon. This can be a smokestack, road, building or even a cloud. In this example, I am using the Sears Tower in Chicago (after taking off from Meigs Field).



Select a reference point on the horizon, such as a smokestack, road, building, etc. I'm using the Sears Tower in Chicago here.

Maintain a level flight and airspeed of about 140 knots. Bring the stick back slowly so you're raising the nose smoothly to 20 – 30 degrees above the horizon. This neutralizes the elevator and deflects the aileron fully in the direction of the roll. Remember, pulling the nose up too much or too little at the start of the maneuver results in a bad roll.

Look to the left and make certain you've set the correct pitch attitude. Otherwise, by increasing backpressure after you've established the correct pitch attitude may force you from the reference point (Sears Tower in this example) or may drop the nose too much when you've started inverted flight.

Most aerobatic professionals believe it's easier to start with rolls to the left. Therefore, hold backpressure on the stick and move it quickly, but smoothly, all the way to one side.

Most aerobatic professionals believe it's easier to start with rolls to the left.

Maintain controls in that position until you complete the roll. Center the stick as the wings become level with the horizon. After the roll is completed the nose is usually 20 - 30 degrees below the horizon.

Maintain controls in that position until you complete the roll and center the stick as the wings become level with the horizon.

Try these to test your skill

Slow rolls and snap rolls

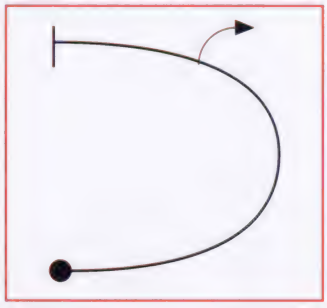
Other types of rolls you can try include *slow rolls* and *snap rolls* (called *flick rolls* in Europe). Most slow rolls must be flown normally on a straight line. Maintain a constant rate for the roll and the longitudinal axis of the airplane must be straight. To fly this type of roll successfully means that you must constantly change rudder and elevator control inputs throughout the roll.

A snap roll also must be flown normally on a straight line. A snap roll is an autorotation with one wing stalled. You must intentionally stall your aircraft by applying positive G-forces and in an outside snap, you need to stall your aircraft by applying negative G-forces. The rudder is then used in either case to start autorotation as in a spin.

The Immelmann

The Immelmann turn is a simple yet very effective maneuver under the proper technical circumstances. Many historians credit a World War I German ace named Max Immelmann with creating this maneuver. However, the version of the maneuver with which most of us are familiar today from aerobatics is not the maneuver that Max Immelmann found so successful.

The following diagram shows that the Immelmann starts with a half loop to inverted flight. A half roll then results in horizontal upright flight. Although no one can say for certain whether Immelmann was the first to perform this maneuver, it was nevertheless used in World War I to reverse direction and gain altitude to "shake" an attacker.



An Immelmann is similar to a Split-S maneuver (see below). It doesn't preserve speed and altitude but instead trades speed for altitude.

As with the loop, a good way to perform your first Immelmann is to line your loop up with a road or very long runway. I'm using the Grand Haven (Michigan) airport again as my starting point with the long road running near the airport. Start the Immelmann by lining up with the road and flying level at between 150-160 knots.

Watch the G-meter on your instrument panel because you need about 3-4 Gs to start an Immelmann. Then start a smooth and consistent pull on the stick to start a steep climb. Apply full power as the nose reaches the vertical. Maintain this climb until your airplane passes through the vertical and completes a half loop. Look to the side to check your flight path.

Look to the side to check your flight path.

Your airplane should be inverted when you reach the top of the loop.

Your airplane should be inverted when you reach the top of the loop.

Then roll the airplane back into the upright position. Look back and as you see the horizon, move the stick to the side to start a roll. Maintain back pressure until the nose reaches the horizon and center the stick as you return to upright level flight. You should now not only be at a higher altitude but changed directions 180 degrees.

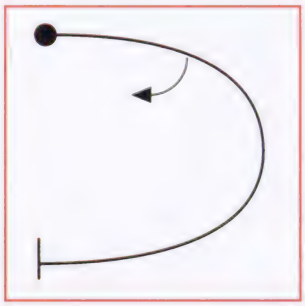
You should now not only be at a higher altitude but changed directions 180 degrees

Split-S

The Split-S, as with the Immelmann, was a maneuver used in World War 1. English pilots called the maneuver the *Split-arse* to describe the effect of the maneuver on the anatomy of the pilot. It was also a popular evasive maneuver of the Nazi pilots in World War II.

Although the Split-S looks like a simple maneuver, even experienced aerobatic pilots can have trouble successfully completing it. Because airspeed builds rapidly during the descending half loop, a sloppy roll technique can lead to a dangerous steep spiral. Therefore, make certain you understand loops and aileron rolls before attempting a Split-S.

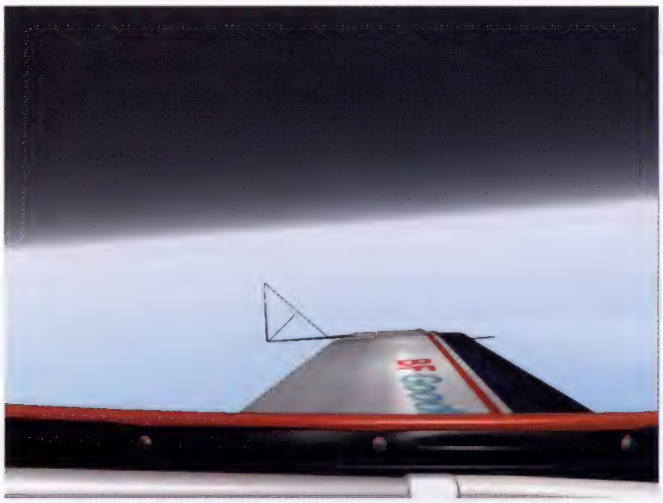
The Split-S starts with a half roll to inverted followed by the second half of a loop downward. (Use the rudder to same side as roll to increase the roll rate significantly). This is another maneuver to reverse direction. This one, like the Immelmann, does not preserve speed and altitude but trades altitude for speed.



Altitude is important to completing a Split-S so the starting altitude should not be less than 3000 feet (maybe even higher until you're more experienced with the maneuver). Start by lining your loop up with a road or very long runway. I used the Grand Haven (Michigan) airport as my starting point and the long and straight road that runs north/south along the westside of the airport.

Keep an eye on your airspeed. Unlike other maneuvers we talk about here, you'll start this maneuver at a slower airspeed. Therefore, adjust your speed so you're flying at about 90 knots in level flight. (To decrease your speed, drop flaps and/or landing gear if necessary. This will allow you to perform a tighter curl). Then start a half aileron roll (see above for information on aileron rolls) and ease the throttle all the way back.·

Look over the nose and make certain the wings are level at the inverted position.



Look over the nose and make certain the wings are level at the inverted position.

Then start a smooth consistent pull on the stick and start a half-loop. Do not let the nose move around the pitch axis. This can be prevented by maintaining enough back pressure on the stick. Keep an eye on your airspeed because you don't want the airspeed building too quickly.

Start a smooth consistent pull on the stick and start a half-loop but do not let the nose move around the pitch axis. Keep an eye on your airspeed because you don't want the airspeed building too quickly.

Finally, recover to straight and level flight. Adjust airspeed as the nose returns to the horizon. You should now not only be at a lower altitude but changed directions 180 degrees.

Recover to straight and level flight. Adjust airspeed as the nose returns to the horizon. You should be at a lower altitude and have changed directions 180 degrees.

Conclusion

You can further test your aerobatic skill by trying other maneuvers such as tailslide, hammerhead and others. For information on additional maneuvers, visit the Full Throttle website (www.ftmagazine.com).

You can enhance your aerobatic skill by turning on the smoke system (press the I key in FS 2000). Then when you're really confident about your ability, use the Flight Video feature in your version of FS to record your aerobatic maneuvers and prove your abilities to your friends.

Create Your Own CFS Missions

By Chris Steele

Part 1 (August/September *Full Throttle*) discussed the structure of the CFS mission files. Part 2 gives you more insight into ground layouts and runways. You'll also find out how to keep your frame rate reasonable, how to get multiple waves of AI planes into a mission and how to trick/avoid some scenery elements.

What can be a greater thrill for a pilot than throwing him- or herself into a quirky and maladjusted piece of machinery and throwing lead at another hurtling piece of metal 10,000 feet off the ground? Or how about throwing that same aircraft against an enemy gun position on the ground while you approach at 300 knots?

Do you think that creating your own *Combat Flight Simulator* (CFS) missions with ground objects and layouts might be interesting? I tend to think so. And if you have a similar interest, I hope the second edition of this feature will be helpful to you.

Last time we discussed the structure of the CFS mission files. In this issue I will give you more insight into ground layouts and runways. I will also give you a little list of more dirty tricks, like how to keep your frame rate reasonable, how to get multiple waves of AI planes into a mission, and how some scenery elements can be either tricked or avoided.

I am once again going to use WordPad, Notepad or a similar text editor for all our .MIS file editing.

Ground Objects

Ground objects (also known as "mission objects") are any non-moving objects placed on the ground by the mission file. I have specified "non-moving" because it is possible to create moving objects on the ground by establishing them in formations and setting a waypoint path, similar to the way you would do so for aircraft. For our purposes here, these moving objects will not be considered "ground objects." (Moving objects will be addressed later.)

Ground objects placed at an airstrip

Dirty Trick

Always start with a copy of an existing .mis file (edit the copy, not the original). This will help to keep the mission structure intact.

Ground objects are also known as "mission objects," because other than prettying up an airport/ground location, you are also going to blow them up or protect them from getting blown up during a CFS mission. Otherwise, the scenery designer would have hard-coded them into the landscape, in which case your weapons will have no effect.

Units

As with aircraft, you must establish a unit.

```
[unit.0]
id=2350
type_id=4050
name=%name_string.86%
position_lat=N28 13.4059
position_lon=W177 21.9731
position_alt=0.000
position_pbh=0.0,0.0,306.0
skill=0
level=0
points=0
damage=0
```

Note that, once again, three things hold true:

- The names are called in a separate names section at the end of the mission.
- Each unit must be of a unit type.
- Each unit must be part of a formation.

This time, make sure that the unit number is in the 2000 range instead of 1000 (like we did for aircraft), and the unit type number is in the 4000 range instead of 3000. Also, don't specify a waypoint path for the ground objects. Huh? What? Back up a second, Bud!

Okay, let me go through all that again, just on the off-chance that you hadn't read the last article, or you actually have a life and have not been coding missions 20+ hours a week for the past eight months.

Names

Each object (aircraft, ship, building or otherwise) must have a name. Names are best established by placing a variable name (%name_string.whatever%) in the unit section and then defining that variable at the end of the mission. As a better example, look in one of the default CFS missions in your loadset. (By the way, making a copy of an existing CFS .MIS file and editing it is my recommended way for writing your first missions.) The name you specify will be the name that appears on the screen when "something happens" to that object, be it having scored a hit or having been blown to Topeka. Also, if the object is a "pointed" object—in other words, if the points field is set to one and the survival or destruction of the object is a measure of the mission's success or failure—the name set in this section will show up near the object if you have aircraft labels turned on in your CFS settings.

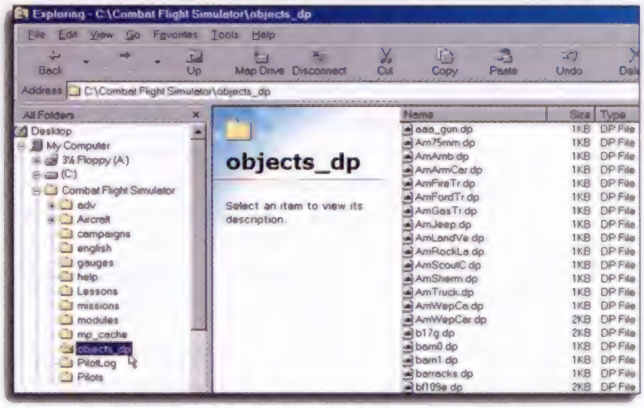
Unit Types

Every object has to be something, right? Well, here's how you establish what that something is:

```
[unit type.6]
type_id=4050
unit_family=4
name=AAA_gun
allegiane=1
gun_ammo=0
```

First, you need to know which objects you want to call in a mission and which objects that you *are able* to call in a mission.

CFS comes with a default library of files that may be used as ground objects. You'll need to know the exact file name of the objects in order to use them. Thankfully, the Microsoft programmers (in one of their more generous moods) used the same name for the object in the library as they did for the damage profile of the object. Hence, you can go to your Combat Flight Simulator\Objects_dp folder to find all the correct object names. Other third-party providers (such as Abacus) have not been as strict with the naming convention, but will usually provide a list of object names in the additional Scenery folder for reference.



CFS's Objects_dp folder

Formations

OK, now what the heck is this about? Why do I need to put a non-moving ground object in a formation? Who ever heard of a string of houses flying in a finger-four?

Well, this is just another of those wacky CFS conventions stating that each unit must be part of a formation. Generally, the formation set for a placement of a group of ground objects will look like this.

Formation section for ground objects

```
[formation.8]
id=6999
type=ground
waypoint_path_id=-1
unit_id_position.0=2305
unit_id_position.1=2306
unit_id_position.2=2307
unit_id_position.3=2308
unit_id_position.4=2309
unit_id_position.5=2310
unit_id_position.6=2311
unit_id_position.7=2312
unit_id_position.8=2313
unit_id_position.9=2303
```

This way, CFS has all it need to know: the number and type of units, where they are to begin, and where and how they may or may not be moving. Got it? Okay, now that we understand the general language of what we're trying to do, what do we want to do with it?

Establishing ground layouts

Once we have declared the units we are going to use for our mission, we have to place them on the ground. You'll notice that each unit has latitude, longitude, altitude and pbh fields. These indicate the unit's starting position.

One would think that altitude is simply the altitude (in feet—believe it or not, CFS seems to switch between Metric and English more than US space probes) of the unit in question. Well, yes and no. CFS typically will ignore what the mission author puts in this field and will, instead, draw the mission object at the "ground level" of the surrounding scenery. This is all well and good if using default CFS scenery, so long as the surrounding terrain is relatively flat. If, however, you are using FS98 scenery, scenery developed by a third party or scenery in rugged terrain, your objects will likely be drawn below the visual level of the terrain. There are a series of terribly difficult fixes to this problem, but they're beyond the scope of what most mission authors are able to do. So, I recommend that you stick to the relatively flatter areas for your first forays into object layouts.

The position pbh field is one more complication. You will notice that the notation here is "0,0,120," or something of the sort. CFS gives the flexibility to not only determine what heading the object faces, but it also gives the mission author full flexibility in all three dimensions. Hence, the "0,0,120" should be read as "0 degrees pitch, 0 degrees bank (roll) and 120 degrees heading (or yaw from true north)."

Where do we want to place our objects?

Method One: Cheating

Here is the easiest way to place objects if you're just starting out and have only a few objects to place. Start CFS in Free Flight mode and slew to the area in which you want to place your objects. Turn map view on, and just keep moving around until you have all the lat/lon/alt/pbh data that you need. Then type this information into the mission file. Be aware that you'll probably have to make some adjustments to the rotation (yaw) data under the pos field due to magnetic vs. true north readings, but you should otherwise be just fine.

As a footnote, this is how I did all the placements for the "Battle for Hawaii, 1943" campaign set. I didn't know any better way, and brute force seemed to be just as good a method as any.

Method Two: Planning

If one knows the general area one is dealing with and at least one latitude and longitude reference point, one can draw out the entire ground layout and then determine the exact lat/lon of all the ground objects in a layout.

To do this, use graph paper, pick a scale and draw how you want the placement of objects. Then determine the lat/lon of the objects by using the original reference point and either adding or subtracting degrees and minutes using the rule of thumb that one nautical mile = one degree latitude or one degree longitude (at the equator). For higher latitudes, one degree of longitude will equal the cosine of the longitude in nautical miles (meaning that one degree of longitude at 45 degrees latitude will equal cos(45) = .707 nautical miles).

Dirty Trick

Follow the mapmaker's rule of thumb: Always place your maps with north up, write the scale on the layout and indicate the starting lat/lon.

Now, drag out your trusty calculator or your favorite copy of Microsoft Excel (though if you have Excel, we'll explore new & better ways of doing business next time) and calculate your

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lat/lon positions. Since you, being a mapmaking expert, have placed true north to the top of your page, you'll be able to determine perfectly the true rotation of the objects.

Method Three: Ground Formations

If you can truthfully define the position of one of your ground objects (to a high degree of accuracy), you can try to establish a formation which will define the position of the rest of the ground objects in relation to the first object.

If you remember from last time, formations for aircraft set the relative position of the objects (aircraft in the former case and ground objects in this case) relative to one lead object. Everything else has an "x," "y" and "z" offset to that lead. Note that the offsets are in kilometers, so we have yet another set of conversions to go through.

By the way, this last method only works if you're using Excel (and Excel will convert it to absolute positions). We will talk about the Excel mission editor next time.

How does all this fit in with the rest of the mission?

Unless you've done anything differently, all of your mission objects will now be set into the mission as nice little visual curiosities that you may pass over or near during your mission. Ideally, you'll want to make it so that your flight path is such that your player's formation is lined up to the target, overflies the target, and then goes about their normal business. The best way of doing this is to establish the following waypoints for the player's formation (in addition to whatever else you might want to do):

1. A point three to five miles from the target
2. The center point of the ground layout

This way, the player will be able to jump to the final lineup on the target, won't be able to mistakenly jump past it, and will be pointed right at the target when the time comes, and so will his/her wingmen. By the way, if the flight is a set of fighters and their objective is "4" (meaning destroy ground objects—remember last article?), the flight will stay in the area until all the ground targets are destroyed.

You may not even want to be the one attacking the targets yourself, by the way. You might want a flight of bombers to drop their loads over the target. How do you get the bombers to pick that nice little patch of real estate, you ask? Well, so long as the points field for the ground objects is set to "1," and the bombers' flight path goes over the objects, CFS will see this as the desired outcome and will trigger the bombs at (or close to) the appropriate time. NOTE: CFS is a lousy shot. Set your bombers to a skill level of "2" unless you want your fighters to have to come back to strafe everything again!

Then again, if you're trying to model a flight of bombers coming in to destroy your player's field, you may want to make the bombardiers a little nearsighted!

Dirty Trick

One other thought regarding waypoints: Remember K.I.S.S.—**K**eep **I**t **S**imple, **S**tupid, meaning the fewer waypoints the better. One can plot a more realistic flight with more waypoints, but CFS seems to get confused sometimes. More waypoints may cause non-player aircraft to dig nice holes in the ground.

Moving Ground Objects

Let's say that, instead of just sitting dead in the water, we want our ships to be moving. Well, the simple story here is that we need to change the following parameters:

- Change your unit number from the 2000 series to the 1000 series. All moving objects (units) in CFS must have 1000 series unit numbers.
- Next, change the unit type from the 4000 series to the 3000 series, for the same reason as above.
- Create a formation—a *real* formation—for the group. Look at Figure 3 for a reasonable formation set up for some ships (by the way, I don't know why you need to set the type to "air" either). Remember to include the objective number. (Remember that as a mission designer, you're pretty much in the same role as a director—here, you're giving your "actors" their motivation.)

Formation for moving objects

```
[formation.1]
id=6001
type=air
waypoint_path_id=5001
suspended=1
directive=1
takeoff_land_flag=0
unit_id_position.0=1010,0,0.0,0.0,0.0
unit_id_position.1=1011,0,-960.0,2592.0,0.0
unit_id_position.2=1012,0,-480.0,7200.0,0.0
unit_id_position.3=1013,0,-5760.0,-3360.0,0.0
unit_id_position.4=1014,0,-7200.0,-6240.0,0.0
unit_id_position.5=1015,0,-5040.0,-7200.0,0.0
unit_id_position.6=1016,0,-10560.0,5280.0,0.0
unit_id_position.7=1017,0,-13440.0,9600.0,0.0
unit_id_position.8=1018,0,-12480.0,15360.0,0.0
unit_id_position.9=1019,0,-1920.0,-14880.0,0.0
```

- Finally, give your objects a set of waypoints to follow. Be careful that you don't have the ground units outrunning your aircraft. This takes a little finesse and experience. Still, if you can solve the old "A train leaves Berlin for Paris at 9:00 going 60 Km/h, and a bomber carrying high explosives leaves London at 10:00 with a mean airspeed of 200 knots..." word problems, you'll have no problem.

A formation of ships

Waypoints for moving objects

```
[waypoint_path.1]
id=5001
waypoint.0=0,1,N21 8.38,W158 34.84,0,,,,30,,0
waypointname.0=%waypointname.0_string.1%
waypointtip.0=%waypointtip.0_string.1%
waypoint.1=0,1,N21 11.74,W158 53.86,0,,,,30,,0
waypointname.1=%waypointname.1_string.1%
waypointtip.1=%waypointtip.1_string.1%
```

Remember to keep the speed of your ground objects down! Your speeds are in knots, and the tendency is to forget to edit this field after copying it from an air waypoint set, hence the US Navy's super secret destroyers capable of 300 knots!

What about a few tricks?

Alright, here's my favorite design trick—probably the one I should have told to you at the very beginning of the first article: When you screw something up, CFS will give you a clue as to what you've screwed up! CFS will give you a friendly "invalid mission" screen, which reads like this:

```
[Mission file error]
error=Unable to Init Unit 1000
title=New Mission - 01
filename=Missions\New Mission01
```

Press Alt + Tab to get out of CFS and look in your main CFS directory. There you'll find a little file called ERROR.LOG. This will explain what CFS choked on. It only covers the first

error CFS runs into, so you may have to go through this process a few times before you have a working mission, but it is better than guessing blindly.

Dirty Trick

Here is a formations trick (going back to the aircraft for a second): Have you ever wanted to make a flight of aircraft come into the mission late? All you have to do is add a few more aircraft to a formation you've already defined. When you add their positions to the formation section, put their "y"-offset well behind the leader (on the order of 15,000 units or so). They won't be cut off from the mission (since the formation's starting waypoint will be within range of the player aircraft), but their entry into the mission's visual field of play will be delayed. Feel free to experiment with higher values here.

That's my story for this time. Next time, we'll go through the Microsoft Excel Mission editor in depth and look at how all of this can be made a heck of a lot easier!

Missed Part 1? Then download it!

If you have missed the first part of Create Your Own CFS Missions, you can download the article from the Full Throttle web site (www.ftmagazine.com).

Part 1 talked about writing a mission, mission files, mission overview, units/unit types, formations, waypoints and more.

The name of the file at the web site is CFSMissions1.PDF. You'll need Adobe Acrobat 3/0 (or higher) to view the file.

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The Sky's The Limit!

Virtual Flight School
VOR Navigation 101

If you fly anything more than touch and go landings in the default areas of your favorite flight simulator, chances are you'll need to use some sort of navigation to get where you want to go.

There are many different ways to navigate an aircraft, with GPS (Global Positioning Satellite) receivers being the preferred method among pilots today.

GPS navigation is probably the easiest and most accurate way to navigate. But before the inception of GPS, most aircraft relied on VOR navigation. Indeed, many aircraft still rely on VOR navigation. Although VORs are scheduled to be phased out soon in favor of GPS, they still provide an excellent means of navigation, with a reliability factor that is more than acceptable for flight navigation.

Many of us think we understand VOR navigation and how it works. This, in fact, may not be the case. This feature, and the continuing series, will provide you with basic and advanced "real world" techniques in both flight and navigation that you can incorporate into your simulator experience.

VORs are actually quite simple to use once you understand the basics of what they are and how they work. So, what are VORs and how do we navigate with them?

About the author.....

Jim Rhoads is the senior writer at *Full Throttle*. He's also a real world pilot and the proud owner of a Piper Cherokee 140. Jim has been an avid flight simulator enthusiast for over 10 years – since the days of FS 4. He resides in Wabash, Indiana, where he can watch the corn grow between airborn excursions.

By Jim Rhoads

VORs Defined

VORs are Very High Frequency (VHF) Omni-directional Range transmitters. Scattered across the country, these provide a location-specific navigation facility that pilots use to guide them from departure to destination. VORs come in a few different shapes and sizes, but usually are a low building type that incorporates a flat disk and an antenna. Their total height is about 30 feet. The Federal Communications Commission (FCC) limits VOR stations to transmit within a VHF band frequency of 108.00 to 117.95 MHz.

They transmit two different signal types: a rotating signal and an omni-directional signal. Omni-directional signals pulsate at 30 times per second, and rotating signals at 30 revolutions per second. The VOR receiver in the aircraft "times" the distance between the omni-directional pulse and the rotating signal and then converts this to a magnetic bearing, either to or from the station.

VOR Station at Kent County International Airport

Types

VOR

The basic VOR uses only the lateral sensing and does not provide DME (Distance Measuring Equipment). In other words, you can navigate directionally with the basic VOR, but it will not provide information to the user indicating how far away you are from the station.

VOR/DME

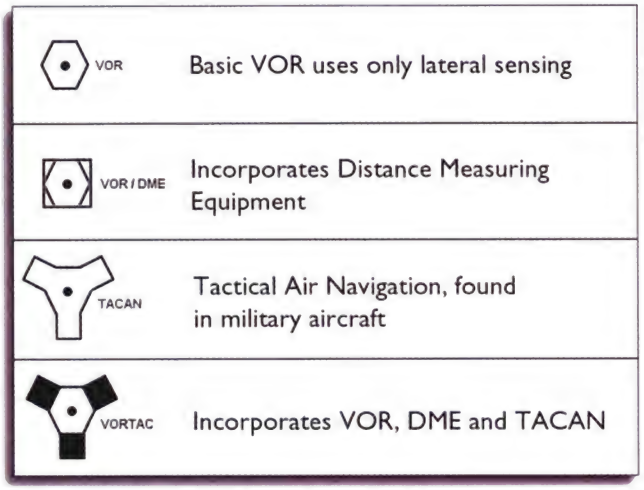
You guessed it — this type of VOR incorporates DME (Distance Measuring Equipment). Not only can the user track the VOR, but he can also determine how far away he is from it (straight-line distance). This requires the aircraft to be equipped with a distance measuring equipment radio.

TACAN

TACAN (Tactical Air Navigation) equipped VORs are mostly used by the military and are not typically used in General Aviation or civilian aircraft.

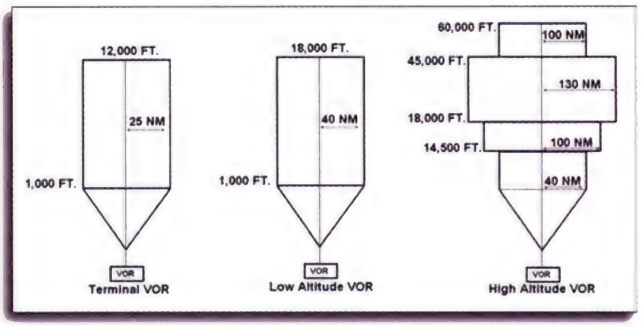
VORTAC

VORTAC-type VORs incorporate the attributes of all of the above, including the basic VOR, DME and TACAN.



Classes

The different classes of VORs give the pilot an idea of what to expect in terms of reception based on altitude and distance from the station. VORs have three classes:



Terminal VOR

The Terminal VOR has a service volume up to and including 12,000 feet AGL (Above Ground Level) and extends to a radial distance of approximately 25 nm (nautical miles).

Low-altitude VOR

The Low-altitude VOR has a service volume up to and including 18,000 feet AGL and extends to a radial distance of approximately 40 nm.

High-altitude VOR

The High-altitude VOR has several service capabilities, at various reception ranges:

- Up to and including 14,500 feet AGL and extending to a radial distance of approximately 40 nm.
- From 14,500 feet AGL up to and including 60,000 feet at radial distances of approximately 100 nm.
- From 18,000 feet AGL up to and including 45,000 feet at radial distances of approximately 130 nm.

How VORs Work

Imagine the VOR station and the signals it projects like a bicycle wheel (with wire spokes like some of us old timers had, not the new mag wheel types). Imagine that the hub of the wheel is the VOR station and the spokes are the radials, or signals, that broadcast from the station. Actually, the key word here is "from" because one of the biggest problems people have in understanding how to use and track a VOR is the difference between tracking inbound or outbound on a radial. I'll explain this later, but for now always keep in mind that a radial always comes from the station. The wheel has 360 spokes projecting from the center of the hub. Imagine that each spoke is a magnetic, or compass, heading.

Flying an Example

OK, let's start with the default situation at Meigs Field in FS 2000. We'll keep life simple by sticking with the Cessna 182. Make sure that you clear your weather by selecting **World | Weather** in the FS menubar. Now click the Clear All Weather button. This will clear the weather and winds to simplify the procedures.

Since you're sitting on runway 36, your DG (Directional Gyro) or Heading Indicator should be set to 360 degrees or "N", and your altimeter should be reading an altitude of 600 feet.

Make sure that your **Options | Settings | General** menu has *Show Tooltips* checked, so that when you position the mouse over the instrument, it will identify the gauge. Click on the *Display/Hide* radio stack button to bring up the radio stack.

Now, we'll be navigating to the Chicago Heights VOR first, by looking at a real map or by using the one in the FS 2000 **World | Map View** menu. You'll see that CGT (the three-letter identifier for Chicago Heights VOR) is southeast behind us. Now double-click on the CGT icon in the map view, and FS 2000 tells us what kind of VOR it is and what class. CGT is a *Low Altitude Class*, and it supports DME with a frequency of 114.20.

Map view of the CGT (Chicago Heights) VOR.

On your NAV1 radio, dial in the frequency of 114.20 MHz in the digital display.

Now move over to your *VOR1 Indicator.* This is where you'll dial in the appropriate heading to track the VOR radials. Selection is done with the round knob, more appropriately called the *Omni Bearing Selector* (OBS). We have already established that CGT is behind and sort of southeast, right? So wouldn't it make sense to turn the OBS to a heading of around 170? Yes, it would, but leave it on 360° or "N" because I want to show you something.

Everything is set and ready to roll. But why hasn't the CDI (Course Deflection Indicator) needle moved? Why is there no indication of life? Because you have not yet reached an altitude that you can receive it. VOR signals can not be read at ground altitude.

Look around and check for traffic, then fire up the 182 for a standard departure, and maintain a heading of 360° or "N". **Remember not to exceed 3,600 feet, because you are just under Chicago's class "B" airspace.* Keep glancing at the VOR1 Indicator. The CDI Indicator needle should swing to the right. We have the right station selected because we know the frequency for CGT is 114.20, so the CDI needle must be alive and well. And chances are that it is, but a prudent pilot will always identify the station.

GIVE THEM SOMETHING TO LOOK UP TO

To children in countries such as Honduras, balanced diets, yearly check-ups and elementary schools are unknown. Using airplanes, volunteer organizations can provide these necessities. For more than 30 years, *Wings of Hope*, a non-profit organization has helped provide airplanes for humanitarian services. If you are not using your airplane, engines, radios and other equipment, we can. If you'd like to make a cash donation, we can use that, too. Your donation is tax-deductible. *Turn your wings into* ***Wings of Hope.***

WINGS OF HOPE inc
Spirit of St. Louis Airport
18590 Edison Avenue, Chesterfield Missouri 63005, USA
1-314-537-1302

If you did not write down the information in the map view, go back and look at the Morse code identifier to see if it lines up with the selected station.

Go back to the radio stack and right below the frequency 114.20, click on the *Pull Ident* button. Be patient and listen for the series of long and short beeps and see if they line up with the information in the map view. The beeps should sound as follows: long, short, long, short, long, long, short, long.

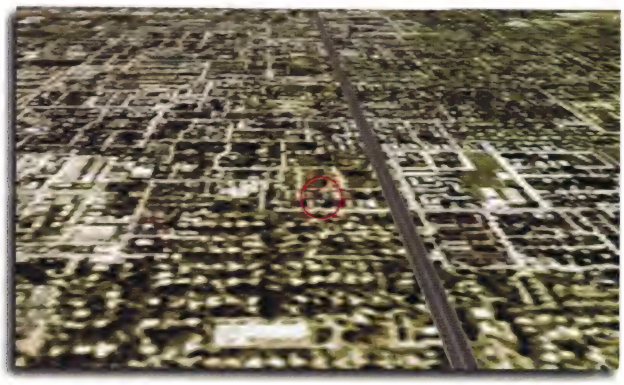
Remember that radials always emit from the station. According to the CDI needle, the 360° radial selected by the OBS is a little bit to the right of our course. So go ahead and turn right to 020° and watch the needle. It should slowly start coming back toward you. Once the needle centers, this tells us that we are crossing the 360° radial from CGT, so turn the aircraft back to a heading of 360°. Under a no-wind condition, if the needle is centered and you are on a heading of 360°, the needle will stay put. This is what you'll track.

So now you understand that you are on the 360° radial from the station. But we need to go in the opposite direction, in other words, to the station, not from it. With the OBS knob, dial in a heading of 180° south on the VOR1 Indicator and begin a standard rate turn to 180° south on the Heading Indicator. Once you have established the heading, is the needle to the left or the right of center? If it is to the right, fly about 15 degrees right or 195 degrees. If it is to the left, turn to 175°.

Remember that you are trying to intercept the radial, or spoke, of the VOR and then you'll try to follow it. Be patient, as it may take a bit for you to intercept the signal and fly its exact heading. Once the needle centers, turn the plane back to the 180° heading and correct as necessary. If it wanders left or right, make small corrections to get back on the radial (spoke), and then correct the heading of the aircraft to try and keep the needle centered.

Was this easier than you thought? OK, let me mess you up. You're heading toward CGT and the needle is on the 180° radial inbound to the station, right? *Wrong*. You're on the 360° radial **from** the station, inbound on a 180° heading. Remember that the radials are like the spokes on the wheel — they come **from** the station. You're flying the reciprocal of the radial.

Continue your course, keeping the needle centered. Keep checking your DME radio to monitor how far you are from the station. Once you have reached approximately 00.5 mile out, press the W key for full window and look down. You should be able to see the VOR station on the ground.



All VOR transmitters in FS 2000 can be seen at their actual location on the ground.

Once you start getting close to the station, you'll start to encounter what is known as *The Zone Of Ambiguity*, more commonly referred to as the "cone of confusion." The closer you get to a VOR transmitter, the more sensitive it becomes. So, if you know that your heading has been holding the course well, and you know you are close, don't start to correct too much. If you keep over-adjusting your course, you'll be trying to correct a normal situation when getting close to or passing a VOR.

View of VOR transmitter on the ground

The VOR starts moving to one side and then all of a sudden the *To/From* indicator changes. Now the "**To**" arrow shows "**From,**" and the needle starts to come back into position.

The "To" and "From" indicator is the little arrow under the CDI (Course Deflection Indicator) needle.

When you're going to the station, it will point forward. When you're going from the station, it will point behind you. Now, what will you do? Maintain that heading and change NAV1 to a frequency of 112.30 MHz. This is the frequency for the Joliet VOR (JOT). If you bring up map view again you'll see that JOT has a frequency of 112.30 MHz, supports DME, and is in the High Altitude class.

Information on the Joliet VOR in the FS 2000 menu

Set the OBS on VOR1 Indicator so that it reads 270° (west). Confirm the Morse code identifier. Once we have identified the station, we already know that Joliet is pretty much west of our course, and the Course Deflection Indicator needle confirms this as well.

Now what? Start turning the aircraft to a westerly heading of 270° (W), and where is the needle positioned? If it is to the left or the right of center, turn about 15 degrees toward the deflection and wait until the needle centers, then get back on the original course of 270° (W). You're now tracking the 090° radial inbound to the station on the reciprocal heading, which is 270°.

This method should work with virtually any heading that you have selected in the VOR1 Indicator that is fairly direct. I have kept the interception of the radials to a closer heading to help the user learn how the VOR on board equipment works. If you were trying to intercept a heading that is less than or more than direct, it would require a steeper angle to intercept the radial. Anywhere from 20 – 90 degrees, but no more than 90. Of course, logic and planning would tell you that if you were 30 miles out and on a 270° heading **to** the station, you would not try to intercept the 360° radial. It is best to wait until you are very close to the station. Now continue your course, keeping the needle centered until you have reached JOT.

Until now, we have been basically flying toward the VOR stations. It is also essential to understand how to fly an *Outbound Radial*. Why would you want to fly a VOR outbound on a radial? Because there may be an airport that you are trying to reach that is say, 35.0 miles outbound on a 60° heading.

Fortunately, I have found such an airport. Once passing the station, begin a standard rate turn to a heading of 060°. Turn the OBS on the VOR1 Indicator so it reads 060 heading and leave the frequency alone. We're using the JOT VOR to track outbound on the 060° radial. If the needle is not centered, make your initial cut of 15 to 20 degrees toward the deflection of the needle, then when it centers, go back to 060° and hold it steady.

For the sake of ease, I have asked you to make sure you had no wind selected in your FS 2000. However, if you had wind, you would need to make additional heading cuts to hold the plane on course. If you can imagine that we have a wind from the southeast, it would be trying to blow the plane off course toward the northwest, which would require us to add a little more "crab" angle to the 060° radial once we intercepted it. It might take five degrees to the right for a moderate wind or 15° to 20° for a hefty one.

Anyway, continue keeping the needle centered until you reach 34.5 miles from the station on your DME radio. Guess where you are? Right back at Meigs Field. Announce your intentions, enter the pattern, grease on a picture perfect landing and take a rest. You can see that coupling VORs with DME can sure help you locate something a lot easier and help you know how far out you are from the station. So, what if you don't have DME equipment onboard the aircraft? The answer is cross-referencing other VORs, which I will explain in another article.

The exercise will take you back to Meigs Field, your starting point.

Navigating by VORs is easy once you get the hang of it and can be challenging as well. Personally, I hate to see VORs phased out. They provide a very reliable means of navigation that is an excellent backup in case your GPS isn't working.

If you do not have real-time aviation maps, use the included flight planner in FS 2000 and select VOR to VOR in the auto routing section, select the Navlog and print the information so that you can begin practicing your navigation skills.

If you can learn to navigate in *Flight Simulator*, you can do it in a real plane too. Flying a GPS is brain-dead stuff (even though I love it). But navigating using VORs requires a little bit of work, a little more planning and is a little more challenging. That adds up to making it just a little more "As Real as It Gets."

Moving?

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Round Robin Adventure

Winter in Alaska

This Round Robin takes place in the breathtaking landscape of an Alaskan winter. I first wrote a Round Robin in this area in 1996. I thought of revisiting the area to see what Microsoft had done with the scenery for *Flight Simulator 2000*. I was so impressed with it that I had to take you on this route one more time. The highlight is a descent in a bay that is flanked by high mountains and where there is no room for error in navigation.

For those who are new to this, Round Robins are published with the intent of having Flight Simulator enthusiasts explore new scenery, refresh our knowledge of geography, practice cross country navigation, fly some approaches at different airports all over the world, and have some fun.

This flight starts in Anchorage and will take you to Seward (SWD), then Homer (HOM), to Kenai (ENA) and then back to Anchorage. The route was flown using the default Microsoft *Flight Simulator 2000* (FS 2000) scenery. FS 2000 has all the necessary airports and navaids. You may also download and install ALASKAPL.ZIP by Dean Salman. It adds all the missing VOR and NDB navaids to the default Alaska. It also makes the towns and villages more lifelike by adding ships in the harbors and buildings in the towns. You might want to fly this Round Robin in VFR conditions a few times so you can appreciate the great job Microsoft did with the scenery there, and even more with Dean Salman's add-on scenery.

If you wish to fly this Round Robin with FS 98, you'll need to download and install ALASKA90.ZIP. (See page ccc for information on the Internet link.) It can also be flown with any flight simulator program that has the required navaids and airports.

I flew a Twin Beach KingAir 350 (default FS 2000 aircraft) on this trip, which is best suited for a small-to-medium turboprop commuter.

In the adventure, you'll be getting information on airport departures, runway numbers, navaids enroute and two or three middle airport destinations for either VFR (Visual Flight Rules) and IFR (Instrument Flight Rules) approaches. Then you'll return to your point of departure (Round Robin).

After you fly a few Round Robins, you'll have a much better command and understanding of the different types of published procedures. You'll learn to handle a lot of information in a very short time, while still maintaining control of your aircraft.

I also suggest that you read the entire route before beginning so you'll have the flight plan clear in your mind.

About the author.....

Al Pelletier was born in Matane, Quebec in 1948. He served 25 years as aircrew in the Canadian Air Force, in a non-pilot role. His job centered around Radar, Forward Looking Infra Red (FLIR) and radio communications. He has over 6,000 hours flying in everything from Canadair Argus, Tracker, Sea-King Helicopter, DC-3s, and P-3s.

Al retired from the Air Force in 1990 as Warrant Officer and is now the owner of a small town Computer Retail store. His hobbies include Flight Sim (Of course), fishing and gardening. He is presently taking flying lessons towards his private license.

By Al Pelletier

Maps of Flight Plan (above and below)

Round Robin Route

Anchorage (ANC)
to
Seward (SWD)
to
Homer (HMC)
to
Kenai (ENA)
to
Anchorage (ANC)

First Leg

From: Anchorage (ANC)

To: Seward (SWD)

Distance: 140 nautical miles (nm)

- In your FS menu bar, select **World | Go To Airports** and select Anchorage, Alaska runway 06R. Set the season to winter, on December 23 and 10:00 local time.
- Dial in the Anchorage (ANC) VOR at 114.3 MHz (Megahertz) on you Nav 1 radio and set your OBS (Omnibearing Selector) to 138°.
- Edit the Weather dialog box to overcast at 1,900 feet, with cloud tops at 9,000 feet; visibility at 10 miles, with moderate snow; temperature: –19°F, dew point: –22°F.
- Taxi to and take off from runway 06R, making a right climbing turn to 11,500 feet at a heading of 160°, to establish on the 138° radial of the ANC VOR (this will happen about 20 nm out).
- 50 nm away from the ANC VOR, set 134° on your OBS and establish the 134° radial of the ANC VOR, and slow down to approach speed.

NOTE: Seward is located in a bay and is surrounded by mountains. This will make the descent very tricky because you'll have to stay clear of the mountain peaks. I talked with Major Tom Mitchell of the 442nd Search and Rescue

Squadron in here in Comox about what procedure would they take in a place like Seward. He answered that they normally would find a place over water and proceed with an "over water" descent procedure and then continue on VFR to the airport. Those of you flying this with a GPS in FS 2000 won't have a problem, but try it with your GPS turned off. You'll really appreciate the tense moments descending over this bay and breaking out with cliffs on both sides.

- You're over the Seward airport when you are 65 nm from the ANC VOR on the 134° radial. Turn right to heading 145° and descend to 1,700 feet at your aircraft's maximum decent rate. In preparation for landing, decrease your airspeed to 120 knots (this will very according to different aircraft). Lower your landing gear, with your flaps set for landing.
- Once you break out of the clouds, turn right to heading 338° and head back over the bay towards Seward for a visual approach to runway 30 (elevation 22 feet).
- Five nm back, you are cleared for landing at Seward.

Second Leg

From: Seward (SWD)

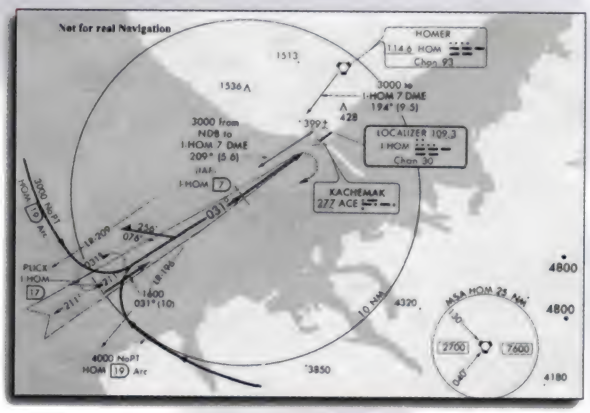
To: Homer (HOM)

Distance: 65 nautical miles (nm)

- Dial in the Homer (HOM) VOR at 114.6 MHz on your Nav 2 radio and the I-HOM LOC (Localizer) at 109.3 MHz on Nav1. Set 031° on the OBS. You can also tune in the Kachemak (ACE) NDB at frequency 277 Hz.

Climbout from Seward, Alaska

- Taxi to and take off from runway 12. Climb over the bay at heading 150° until you reach 7,000 feet. Then turn right and track the HOM VOR at approximately 232°. Continue climbing to 12,500 feet.
- When you are 25 nm out from the HOM VOR, begin descent to 3,000 feet and review your approach procedures for a precision approach (LOC/DME) to runway 3 (actual course 031°, runway length 6,700 and elevation 78 feet).
- Overfly the VOR at 3,000 feet and turn left to heading 215°, at approach speed, until 11 nm out from the localizer. Then turn left to heading 076° and intercept the localizer. Now set your decent rate to 500 feet per minute, until the runway is in sight. Then, at your own discretion, continue with your approach to runway 3.
- You are cleared to land; check that your gear is down.



Approach plate for Homer

Third Leg

From: Homer (HOM)

To: Kenai (ENA)

Distance: 50 nautical miles (nm)

- Dial in the Kenai (ENA) VOR at 117.6 MHz on your Nav1 radio and the Wilwood (IWW) NDB at 379 Hz.
- Set the weather to "No weather" so that you'll have clear skies.
- Taxi to and take off from runway 21, making a right climbing turn to 3,000 feet at an initial heading of 270°. This route will provide you with a beautiful coastal tour to Kenai Municipal airport. Keep an eye on your VOR and NDB needles for reference and position.
- When the airport is in sight, proceed with a visual approach to runway 1L. (The "L" in this case stands for Land — not Left. There is also a RUNWAY 1W that is for "Water" and float planes).

- You are cleared to land on runway 1L (elevation 92 feet, length 7,575 feet). Check that the gear is down.

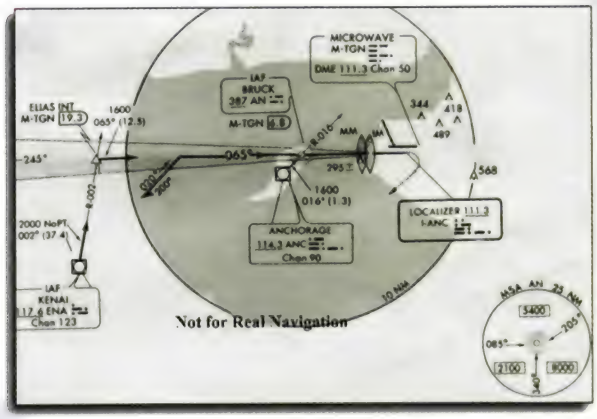
Fourth Leg

From: Kenai (ENA)

To: Anchorage (ANC)

Distance: 50 nautical miles (nm)

- Set your FS clock to 1450 local time (still December 27).



Approach plate for Anchorage

- Dial in the Anchorage VOR (ANC) at 114.3 MHz on your Nav2 radio, and the localizer (I-ANC) at 111.3 MHz on NAV 1. Set your OBS to 065°.
- Take off from runway 9R, make a climbing turn to 7,000 feet, and track the ANC VOR at an approximate heading of 020°.
- 25 nm out of the ANC VOR begin your descent to 2,200 feet in preparation for an ILS approach to runway 06R at Anchorage International Airport. (Actual course is 065°, elevation is 144 feet, runway length is 10,897 feet).
- Intercept the localizer (shortly after crossing over the VOR) and continue with the approach.
- You are cleared to land on runway 6R. Check that the gear is down.

Land at Anchorage, Alaska

WELCOME HOME!

Scenery Requirements

FS 2000 users:
You can use the default scenery but we recommend adding ALASKAPL.ZIP to your default scenery for better effects.

FS98 and FS6 users:
Add ALASKA90.ZIP to the default scenery, along with the necessary texture files associated with most scenery. All of the files are available at: ftp://wings.ark.com/pub/fullthrottle/RoundRobins/ftRound Robin011, at http://Simulatorwings.net/files/patches.html or at http://mars.ark.com/~apeltier/fullthrottle/

You'll also find extra maps and approach plates at ftp://wings.ark.com/pub/fullthrottle/RoundRobins/ftRound Robin011

Many thanks to Chris Squire for test flying the route. Chris is a retired military pilot with over 12,000 hours of flying. Also, many thanks to Dean Salman for his FS 98 Alaska scenery.

Visit Al Pelletier and his crew at http://Simulatorwings.net (e-mail: apeltier@mars.ark.com)

Looking Closely at FS 2000 Scenery

by Tim Dickens

Microsoft's *Flight Simulator 2000* (FS 2000) marks a major step forward in flight simulator technology. This new version incorporates Elevated Mesh Terrain (EMT) scenery. Based on this, the basic nature of FS scenery has changed.

Before, the FS world was based on a "flat Earth" terrain model; now the scenery engine uses a 3-D terrain model. This means that some scenery commands and techniques familiar to scenery designers are no longer used or have fundamentally changed. However, Microsoft did build in a tremendous amount of backward compatibility for scenery in FS 2000, so the vast majority of scenery designers' tools and tasks remain unchanged.

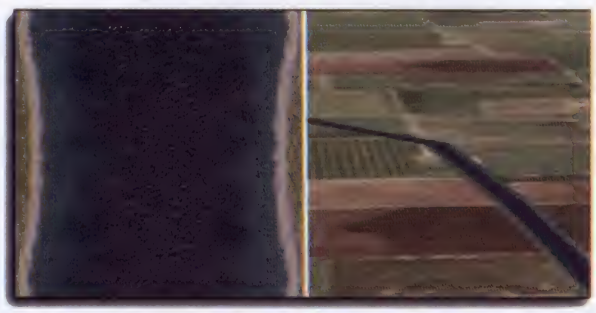
In our last issue, we described some basic attributes for the FS 2000 roads, rivers, polygons and other commonly used objects. In this article, we will expand on some of these ideas and review what is new in scenery design for FS 2000.

Texturing Roads and Rivers

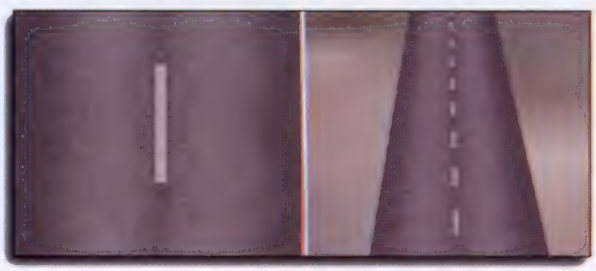
Most of the default Microsoft scenery utilizes non-textured rivers. It is still possible to do this, as it always has been when designing scenery for Flight Simulator. However, if you want a custom textured river, like the one illustrated below, you can create one.

When the scale factor is set to "1," FS 2000 will draw repeating patterns of the entire texture. This will result in the entire texture being drawn continually from segment to segment, oriented in the way you want them to appear. It is important to have your drawing scale set at one (1), or you will have visibility problems.

It is also important that the rivers created for FS 2000 use the customary commands that have been used for this type of object since FS 5. In SCASM, for example, this is called "RoadMoveTo2/ RoadLineTo2." (River commands have always been the same native commands as roads, but without any lighting possibilities.) This enables the river to follow the varying terrain altitudes and always appear on top of the terrain. Some programs, such as *Airport & Scenery Designer* (ASD), have used polygon instructions in the past, since they make better river bends. If this is the case, change your object type to Road and make sure the object is not lighted. ASD v. 2.1 has changed this and now uses the native river commands to enable drawing for FS 2000.



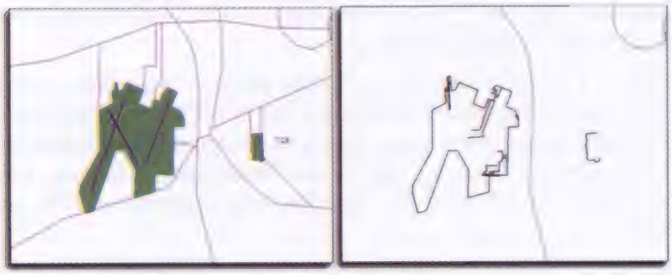
The custom texture (left) is translated exactly to the scenery in FS 2000 when scale factor 1 is used.



You can create custom road textures (left) and get excellent results in your scenery (right).

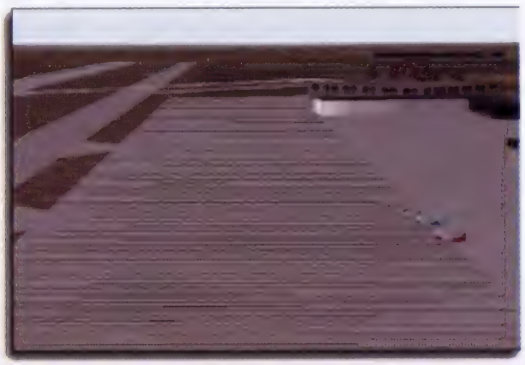
Flattening polygons

The Microsoft default scenery utilizes *flattening polygons* underneath airports to allow flat (planar) polygons to display properly on top of the EMT. This allows you to create scenery on top of the elevated mesh terrain at any location, without using the flatten switch in the FS 2000 SCENERY.CFG file. Flat polygons have no visual attributes and are merely code that tells the FS terrain what to do. They create a flat area at your specified elevation for all visual polygons. Since this will be a common technique in scenery design, a brief description is in order.



ASD v. 2.1 display of the default Wichita, Kansas visual scenery (above left) and its corresponding flattening polygon (above right).

With current design tools, it is necessary to place flat polygons on top of the terrain using only RefPoint 2 (a reference point with an absolute elevation command) to avoid visibility problems, like the default terrain bleeding through your polygon.



This bleed-through effect is a common visibility problem using standard ground polygons without a flattening polygon.

The underlying flattening polygon prevents this from occurring, without having to use an elevated command for the polygon. It also clears up some taxi/landing problems that can happen over some of the default terrain.

The most important thing to remember is that FS 2000 looks for these flat polygons when loading the scenery files and adjusts the terrain altitude accordingly. If FS sees two or more flattening polygons within two to three nautical miles of each other at different altitudes, one flat polygon will "win" and one will "lose," resulting in both areas being at the same altitude. This can make altitude-dependent objects, like runways, have incorrect visibility. Keep this in mind when creating your scenery.

FS 2000 also uses flat polygons for coastlines. The visual coastal polygon texture is created in the same .BGL file as the flat polygon, just like the MS default scenery. In this case, it uses the default MS water texture, which can not be changed.

Also, remember that the purpose of flattening polygons is to create a completely flat terrain, so that airport polygons, etc., (which are completely flat) can display properly. It is **not** intended as a tool to reshape the default terrain elevation over a large area! It is also **not** intended to make drastic changes in the default elevation. I have found that the published airport data and the FS 2000 elevation data underneath the airports are usually very close. The flattening polygon will allow you to make fine adjustments to this altitude to conform to your data and to enable your polygons and runways to display correctly. Remember that if you are creating an airport with an elevation different than the default value, your new flatten polygon must cover the entire area of the default flattening polygon.

If you want to find the flattening polygons in the default scenery directory, there is a naming convention to the .BGL files. Files beginning with the letter "F" are section 9 visual scenery files. Your airports, hydrography, transportation, coastlines and polygon objects will be located here. You will also find files in the default directories with the same number, but with the letter "M." These are the files that contain the flattening polygons.

Currently, ASD is the only program that generates a flattening code.

Scale Factors and Layering

The addition of "Z" buffering in FS 2000, which generates the drawing order for each pixel of the display according to its distance from the observer, can create unexpected visual results when layering two flat polygons on top of each other. Depending on the relative size of the polygons, a larger, underlying polygon can "overpower" a smaller one, rendering it invisible. This does not seem to happen for areas the size of most airports. But the larger the underlying polygon is, the more likely this is to occur. Sometimes this can be defeated using *Scale* factors, where the underlying polygon is drawn at a smaller scale than the smaller polygon on top. Note that the default scenery uses 0.50 scale exclusively. This, however, is not very reliable.

A familiar scenery technique, the use of layering, or LayerCall in SCASM terminology, seems to work best. In some scenery design programs, this is called *Priority.* Using LayerCall gives the scenery engine specific instructions regarding the drawing order of flat polygons.

The thing you will find different in FS 2000 is that the scenery engine does not work with LayerCalls lower than 24 very well. In the past, a typical scenery will draw the runways at LayerCall 24 (24 layers up), so that it was always drawn last, no matter what. This still works as before. But in FS 2000, when layers 1-23 are utilized, it tends to create the same bleed-through problems with polygons described before. If you encounter this situation, you can solve the problem by making your small polygon on top LayerCall (Priority) 24, just like the runways.

Day only drawing

It is possible to place standard flat polygons over the default EMT, if there is no large variation in the terrain, by using RefPoint 2 (elevation command) above the highest point of the terrain. If you find it necessary to place your own custom polygon over a default city texture that has night lighting effects, it will result in the area being completely dark at night. In this case, it is a good idea to give the scenery instructions to only draw the texture during the day.

As an example, in SCASM, this can be achieved using the following scenery code:

```
IfVarAnd(:label28C1)
```

(means only do this during daytime)

```
Inst_7D
TexPoly
```

(just an example of a polygon instruction)

```
:label
```

(close the operation)

This tells the scenery engine to only execute the drawing instructions within the *:label* commands during the daytime.

New FS 2000 Runway Commands

There are new *surface types* for FS 2000 runways: light and dark dirt runways, light and dark gravel runways, a steel runway and a water runway. Secondary VASI/PAPI lighting is also now possible for FS 2000, and STOL markings are also available. The night lighting effects are excellent.

We will discuss runway instructions in a future issue. What is important to know at this point is that when FS 2000 was first released, it contained a bug that made it impossible to shut the lights off, even on closed or turf runways! This was corrected with the Microsoft patch. Now, lighting controls, including PCL lighting, features work as before. But, you **must have the FS 2000 patch installed** to take full advantage of the lighting features!

The Airport Facility Directory (AFD)

A new AFD .BGL file will update the FS 2000 database with your new runway numbers/locations. However, it is important to note that if you want to overwrite the default FS 2000 AFD data, you must use the exact same name and spelling syntax as the default airport! Otherwise, two entries will appear in the FS 2000 **Go To | Airports** menu. If your syntax is exact, FS 2000 will overwrite the default data with your new runway locations, etc.

For example, if the default airport is "Anytown Regl" in the FS 2000 menu, use this same spelling. If you make your airport "Anytown Regional," for example, you will see two entities in the FS 2000 **Go To | Airport** menu.

The *FS 6 and before* menu system for start locations in your scenery still works in FS 2000 like it did in FS 98. So, if you want to set startup locations at your airports on the apron/ramp, in addition to the runways, you may still do so. These menu selections will show up in the FS 2000 **Go To | Airports** menu under *FS6 and before*.

Exclude files

Exclude files work much as they did before. They will exclude visual scenery (section 9) within a specified area. However, over the years exclude files have often been generated that incorporate multiple aspects of exclusion. This means using one exclude file to eliminate all static scenery, navaids, ATIS, etc. This has caused problems in some cases, but now in FS 2000 you **absolutely can not** do that, or your exclude will not work!

I recommend that you use your exclude tool only for static scenery, such as rivers, roads, airports and 3-D objects. To exclude the default navaids, I recommend using the *Exclude switch* in the FS 2000 SCENERY.CFG file, although using a separate exclude file should work as well. To my knowledge, there is no limit to the number of exclude files you can use in your scenery directory. I have used up to 20 without problems.

Tips for airport polygons:

1. *Only use one (1) flattening polygon per airport. You do not want to have redundant flat polygons.*
2. *In cases where the airport altitude does not agree with the default scenery, you must make sure your new Airport Property polygon covers the entire default flat polygon.*
3. *Avoid complex, concave polygon shapes. They can result in FS 2000 either not drawing them at all or displaying odd visibility effects, like this apron polygon. This polygon would not show up for me, no matter what I did. Splitting it into two polygons solved the problem.*

Also, keep in mind that, to my knowledge, there is no way to exclude the default FS 2000 ATIS messages at this time. Exclude files, or the exclude switch in the SCENERY.CFG file, **will not** remove the default terrain texturing.

Installing your New Scenery in FS 2000

The scenery installation process in FS 2000 is simplified and straightforward compared to previous versions of Microsoft Flight Simulator. Before FS 2000, the scenery information was stored in a database file called WORLD.VIS, which was located in the main Scenery directory. This is no longer the case.

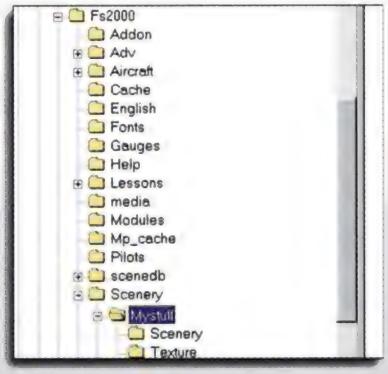
FS 2000 now looks for add-on scenery and the default scenery installed during FS 2000 setup in a simple-to-edit text file called *SCENERY.CFG*, which is located in the FS2000 root directory.

If you have not yet installed any add-on scenery to FS 2000, only the default entries will be seen in the SCENERY.CFG file. If you did a full install of FS 2000 to your hard drive, with all of the available scenery areas, there will be 72 entries in this file, with the last one being Tokyo:

```
[Area.072]
Group=Tokyo
ID=Tokyo
Title=Tokyo
Active=TRUE
Layer=72
GroupID=5
Local=scenedb\cities\tokyo
```

The entry at the bottom of the file, with the highest [Area.xxx] number, is layer/priority one in the **World | Scenery Library** menu in FS 2000. If the default scenery area, in this case Tokyo, is installed on your hard drive, the configuration entry will read "Local=scenedb*." If the Tokyo area was left on your CD-ROM, it will read "*\Tokyo". Assuming that you want to add your scenery to the hard drive, do the following:

1. Make a new directory somewhere on your hard drive. You can add this directory to the default FS2000\Scenedb structure, to the FS2000\Scenery structure, or any other location on your drive. In this example, the scenery called "Mystuff" is added to the FS2000\Scenery directory, and it is the first scenery add-on for FS 2000.



2. Next, make sure that your files are correctly installed at that location, and make a new entry in your SCENERY.CFG file, as follows. Note that it is only necessary to point to the primary folder for the scenery; you don't need to enter the entire path (for example, C:\FS2000\Scenery\Mystuff\Scenery*.bgl) as in FS 98 and before:

```
[Area.073]
Group=Mystuff
ID=Mystuff
Title=Mystuff
Active=TRUE
Layer=73
GroupID=5
Local=scenery\Mystuff
```

3. This holds true for scenery installed in the root FS2000 directory structure. If you want to keep the scenery in another place on your hard drive (C:\Scenery\Mystuff, for example), you can do this, too. But in this case, you must point to the correct directory root on your hard drive:

```
[Area.073]
Group=Mystuff
ID=Mystuff
Title=Mystuff
Active=TRUE
Layer=73
GroupID=5
Local=c:\Scenery\Mystuff
```

The Exclude Switch

Another new feature of FS 2000 is the use of the *Exclude* switch. Using the exclude switch you can:

- Exclude all visual (static) and navaid default features
- Exclude only visual (static) scenery
- Exclude only navaids

Note that the default FS 2000 EMT **is not** part of the visual scenery and can not be excluded by any means.

This is also described in the FS 2000 README.TXT file, but here is a quick refresher:

You need to define the northwest corner and southeast corner of the exclude area in the SCENERY.CFG file. In this case, let's use the area around Las Vegas, Nevada as an example.

ASD display of the default scenery around Las Vegas.

If you have these coordinates in *degrees / minutes / seconds*, translate the numbers to the format FS 2000 uses in its configuration file. Convert the coordinates from *degrees / minutes / seconds* to fraction minutes (*degrees / minutes*) by dividing the seconds by 60. For the example illustrated above, 36° 15' 24.1725", divide 24.1725 by 60 (=.40) and add this after the minutes to yield 36° 15.40'. After translating the above numbers, you should have the northwest corner as N36° 15.40', W115° 30.52' and the southeast corner as N35° 52.34', W114° 49.39'.

Add this expression with an *Exclude*= statement in the FS 2000 SCENERY.CFG entry for the new scenery:

```
[Area.073]
Group=Mystuff
ID=Mystuff
Title=Mystuff
Active=TRUE
Layer=73
GroupID=5
Local=scenery\Mystuff
Exclude=N36 15.40, W115 30.52, N35 52.34,
W114 49.39, vors,ndbs
```

In this example, the exclude switch will eliminate all VOR, ILS (considered a VOR) and NDB navaids from the defined rectangle.

If you want to exclude only static scenery, make your exclude switch:

```
Exclude=N36 15.40, W115 30.52, N35 52.34,
W114 49.39, objects
```

If you want to exclude all of the static scenery and the navaids, make your exclude switch:

```
Exclude=N36 15.40, W115 30.52, N35 52.34,
W114 49.39, all
```

**Important note: Only one (1) exclude switch is allowed per scenery area entry. Also, syntax is critical. Do not omit commas or spaces between the entries. Do not allow any [RETURN] within the statement!*

Your new scenery is now installed into FS 2000.

The SCENERY.CFG Flatten Switch

The flatten switch in FS 2000's SCENERY.CFG is quite different than the flattening polygon described above. The flatten switch can make radical changes to the default FS 2000 elevation grid and effectively flatten an area of the world up to 90 degrees of longitude and 45 degrees of latitude (which is a very large piece of the world). It can flatten the terrain at any desired altitude, from -2,000 to 99,999 feet (based on sea level).

The default terrain texturing will remain, but the entire area specified will be completely flat within the specified dimensions. This can be useful when installing FS 98 and before "flat Earth" scenery, but there are limitations.

A maximum of 10 Flatten switches per Scenery Area entry in the FS 2000 SCENERY.CFG file is possible. This is more than enough for many add-on sceneries. However, if the add-on covers a much more extensive area, like an entire US state or even a whole continent, it will likely not be enough.

Since your original add-on scenery was coded with runways declared at a given altitude (as it still is now), each runway altitude must conform to the flattened elevation. It is likely that if you have ten airports, you will have ten runway altitudes. So in this case, you will need ten separate flatten switches. If the add-on scenery has a more extensive area than this, you will find it difficult to add it to FS 2000 as-is. It would be very easy for the scenery author to split the scenery up into pieces, to be installed separately in the SCENERY.CFG file, and make everything work. But, the user will likely not be able to do this on his own.

In FS 98 and before, textured synthetic ground "tiles," also known as "hole seeds," determined the ground texturing and altitude. These have no function in FS 2000, and will not effect the ground altitude in any way. FS 2000 simply ignores this scenery code, so trying to use them in FS 2000 to affect the ground altitude and texturing simply will not work. Ground elevation and texturing is solely determined by the default terrain texturing and the flatten switch.

Adjacent (touching) flatten switches at different altitudes will often not work. Most likely, you will get one single altitude. If the runway elevations at two airports within this area are different, you will likely see either a runway floating in the air or a runway buried underground at one of those airports.

Syntax is very important. If the area is not defined with four sides, the coordinates are not in order (clockwise or counter-clockwise) or commas and/or [RETURN] commands are missing from the text string, the flatten switch **will not** work. If several overlapping switches are used, it is also likely that none of these will work.

To create flatten switches in the FS 2000 SCENERY.CFG file, do the following:

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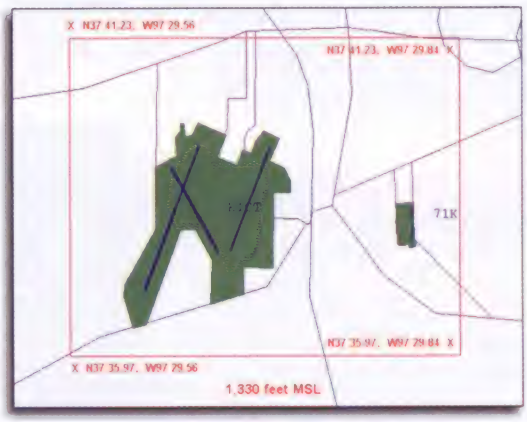
1. Determine the coordinates of the area you wish to flatten, just like you did for the exclude switch. Only this time, *you must define all four points of a rectangle.*
2. You may create your flatten switch using any of the illustrated points as your starting point and define the area either clockwise or counter-clockwise. In this case, we will begin in the northwest corner and proceed clockwise.

```
Flatten.0=1330, N37 41.23, W97 29.56, N37
41.23, W97 29.84, N37 35.97, W97 29.84, N37
35.97, W 97 29.56
```

This will flatten the defined area to 1,330 feet MSL.

Next time we will look closer at the default scenery code, the extended bitmap format FS 2000 uses for textures, and hopefully, shed light on re-texturing the FS 2000 elevated mesh terrain.



The area around Wichita, KS (1,330 feet MSL) showing four flattened coordinates.

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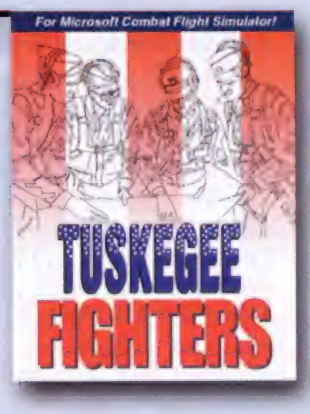

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The Latest 3-D Video Cards

By Rod White

Let's face it, when one tries to take flight without a good 3-D accelerator board these days, one is virtually grounded. With this in mind, we continue to look at the hottest new 3-D accelerator cards on the market. This time we'd like to give you an in-depth look at two very impressive cards that do more than just accelerate your favorite flight/combat simulations and 3-D games.

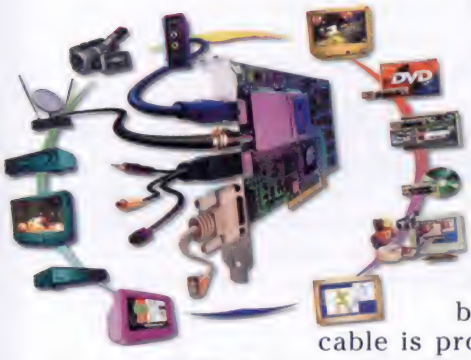
All-In-Wonder 128, from ATI

For years now, ATI has been the market leader when it comes to OEM (Original Equipment Manufacturer) video cards. You can find an ATI 3-D accelerator chip integrated on a motherboard in the "super store" PCs all over the US and even abroad.

However, ATI has never been the leader in terms of raw horsepower or image quality in the 3-D accelerator market. The ATI Rage Fury 128 debuted a while ago now, and although it was late to market, it ended up being a decent option. It featured good performance in 32-bit color, and while its 16-bit performance could have been better, its visual quality made up for what it lacked. For years ATI has made the best multi-purpose video cards, and the All-In-Wonder line has been very successful. So, it is not surprising to see that ATI is continuing this product line with the latest version, the All-In-Wonder 128.

The All-In-Wonder 128 card is based on the Rage 128 graphics technology, so essentially it's the same chip used in the Rage Fury. The main difference is that the Fury came equipped with 32MB of high speed memory, but the All-In-Wonder 128 only comes with 16MB. However, a 32MB version is available at an additional cost. As a 2-D performer this card is excellent, and in the 3-D arena it's not going to topple any of the top-of-the-line performers, but it's no slouch, either. The card also features a 250MHz RAMDAC (Random Access Memory Digital-to-Analog Converter), allowing for great 2-D output at up to 1,600x1,200 screen resolution.

The card also features impressive DVD playback in hardware, so if you have a DVD drive in your PC, this card is an excellent option. In the past, when it came time to take advantage of the Video-In, TV-Out and Video-Out ports, a mess of wiring needed to be plugged into the back of the previous All-In-Wonder cards. Well,



you still need to use cables (and many are provided with the card, which is a nice touch), but they have made it a lot easier this time.

For Video-In, a little box that connects to the back of the card via a cable is provided. On the box you'll find composite video-in, S-Video-In and standard RCA right and left audio-in jacks. Best of all, the cable is about six feet long, giving you a lot of room to work with and completely eliminating the need of cluttering everything right behind your PC.

To take advantage of TV/Video-Out and Audio-Out, a wiring harness is used. This also plugs into the back of the video card and features a single composite and S-Video connector and a mini-plug headphone-size audio-out connector that can be plugged into the audio-in on your soundcard or another external device. The TV-Out option is also nice if you'd like to engage in gaming on your big screen or any TV that's larger than your monitor.

You can also run your CD-ROM or DVD drive audio internally through the card, as a CD-In and CD-Out connector can be found on the card itself. Finally, a coaxial cable connector resides on the back of the card, too. This is used to take advantage of the TV-Tuner functionality. I should also mention that the TV-Tuner is top-notch, which is not surprising, because ATI always did make a nice TV-Tuner. The TV-Tuner software has many great features. Best of all, it's easy to use and has great options, like Closed Captioning, the ability to preview many channels all at once and video capture. If you have a camcorder, you can connect it to the card to take advantage of the video capture and still-frame capture capabilities. What's more, you can even record TV shows to your hard drive with the Digital VCR.

To help you take advantage of the video editing capabilities, ATI includes a full version of MGI's *Video Wave II* software, which normally retails for about $100.00. A DVD player interface is also present. And for gaming, they were kind enough to toss in a full copy of *Moto Racer 2* from Electronic Arts, and *Expendable Lite* (which is essentially a demo version, but they offer an upgrade to the full version for $6.75, which is a good deal).

Conclusion

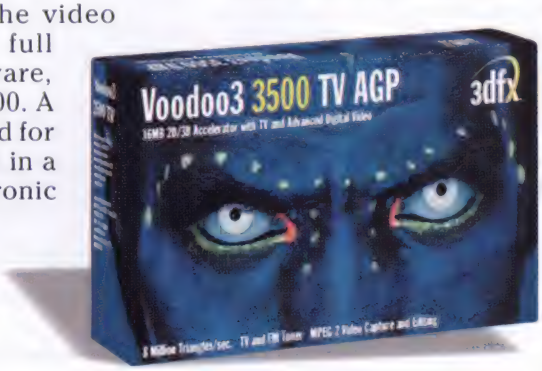
The All-In-Wonder 128 is a great all-in-one solution for many casual gaming enthusiasts, as it features decent Direct 3D, Open GL performance, superb 2-D performance, and it's a true AGP 2x card. The All-In-Wonder 128 comes with an excellent suite of software titles. It features more capabilities (TV-Out, Video-In, Video-Out, Audio-Out, TV-Tuner, Digital VCR, Video capture, still capture, etc.) than most home entertainment centers. It is priced right, at $150-$199 (depending on where you shop). On the downside, it's not as fast as the hottest stand-alone 3-D accelerators on the market today. The 32MB version is almost $80 more, and is based on the Rage 128 (ATI's very latest chipset is the Rage 128 Pro). All in all, you really can't find a better solution for the price that can do everything this card can, including Direct 3D and Open GL support for your favorite flying and shooting PC titles.

Voodoo 3 3500-TV, from 3Dfx

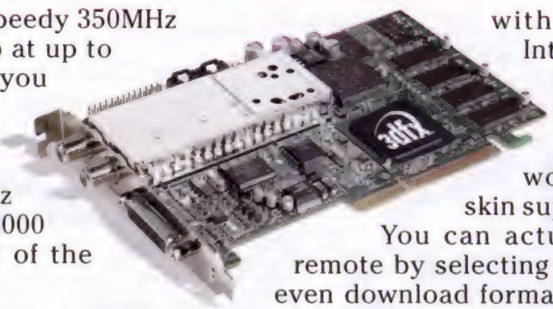
3Dfx has been one of the leaders in 3-D accelerator technology for years now, and in 1999 they purchased STB. After the merger, much of STB's technology was put to good use. An example of this is their PCI TV-Tuner.

The Voodoo 3 3500-TV is the final card to surface in the Voodoo 3 line of products, and it incorporates the technology used by STB's TV-Tuner, plus a whole lot more. As you already know, the Voodoo 3 cards are very fast performers, even though they are not true AGP (Accelerated Graphics Port) cards, as they lack the ability to directly access system memory (RAM) for texture storage. They still have a 256x256 texture size limitation as well. That's not the only limitation of the Voodoo 3 technology, but let's just say that if you need a true AGP card, none of the AGP cards offered by 3Dfx can do the job as well as some of the latest and greatest solutions from nVidia and other competitors.

However, the Voodoo 3 line does offer some very impressive performance in titles that are not meant to take full advantage of AGP. But Voodoo 3 does offer 3Dfx Glide support for older titles that you may still enjoy playing. The Voodoo 3 3500-TV features the best API support, as it offers the ability to run 3Dfx Glide, Direct 3D and Open GL titles, which is something no other card can do.



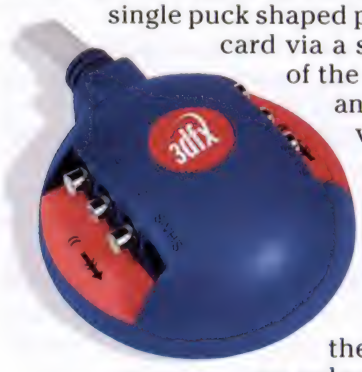
The Voodoo 3 3500 features a speedy 350MHz RAMDAC and can run your desktop at up to 2,046x1,536 resolution (that is, if you have a monitor that can handle such a high resolution). The core clock engine is set at 183MHz, which is much faster than the166MHz core clock speed of the Voodoo 3 3000 and the 143MHz core clock speed of the Voodoo 3 2000.



The Voodoo 3 3500-TV comes equipped with 16MB of high speed SDRAM. Now, considering the limitation the Voodoo 3 technology has with the maximum size of textures (256x256 only), 16MB is more than sufficient for what it must do, as it can still process larger textures by breaking them down to 256x256.

The Voodoo 3 3500-TV is very much like the ATI All-In-Wonder 128. However, it is also very different in many ways. Unfortunately, none of the Voodoo 3 products can offer support for 32-bit color gaming. But they do offer amazingly detailed 16-bit color performance and image quality. Like the All-In-Wonder 128, the V3 3500-TV features Video-In, Video-Out, TV-Out, Audio-In and Out, a TV-Tuner and FM Tuner.

3Dfx went about things a little differently in terms of design by making the layout for the various connections even better than the All-In-Wonder 128. A single puck shaped pod is tethered to the video card via a six-foot cable. On one side of the puck is the audio/video-in and on the other is the audio/video-out, with both composite and S-Video connectors. Standard RCA jacks are provided for the audio connections as well.



The monitor plugs into the opposite end of the cable, so only one connection is made to the video card by this single cable, instead of multiple cables running in and out from the card. The benefit is that 3Dfx has really kept everything away from the back of your PC, which is a blessing when it comes time to do some video capture or making connections to your TV for big-screen gaming. The only connectors you'll find on the back of the cards are the main connector for the external puck cable, a coaxial cable connector for cable TV and another coaxial connector for an FM antenna.

In the box you get one CD with the 3500 driver, 3Dfx Tools, *WinDVD* (a software DVD player) and *VisualReality* video editing software. A second CD comes with a full version of Epic/GT Interactive's *Unreal*, and a coupon is also included to get a full copy of *Unreal Tournament*.

Another neat little feature worth mentioning is the custom skin support for the "on-screen remote." You can actually customize the on-screen remote by selecting different formats for it. You can even download formats other users have created. So, while it's not a groundbreaking feature, it is kind of neat.

Conclusion

The Voodoo 3 3500-TV is a very nice all-in-one solution. However, it does lack some of the features you can find in most of the stand-alone 3-D accelerators on the market today, which feature more onboard RAM, support for textures larger than 256x256, and the ability to offer 32-bit color rendering.

Is this a bad thing? That depends, because if you are heavily into 3-D titles that really need full-blown AGP support, then the Voodoo 3 3500-TV is not the ideal solution. But it does run AGP titles very well via Direct 3D. It's when it needs more than 16MB of memory to work with that it finds itself in trouble. For the most part, a card like this will do just fine for casual gaming enthusiasts who are looking to do a lot more than play games on their PC. For that purpose, this is without question one of the speediest cards you can get if you're into 3Dfx Glide, Direct 3D and Open GL games in 16-bit color.

This is by far the easiest card of its kind to use, because the puck features a six-foot cable keeping all of the connectors away from the back of the PC. So, when it comes time to connect a camcorder or another external video device, there's no fumbling behind the PC. It features great video and still-capture capability, a superb TV tuner, support for TV-out for big-screen gaming and a FM tuner to boot. At $200-$250, this card is priced a little higher than the All-In-Wonder 128. However, it does feature a better software bundle for gaming enthusiasts. To sum it up best, the Voodoo 3 3500-TV is the best all-in-one solution for casual gaming enthusiasts. It not only gives you all the bells and whistles, but it offers support for the most APIs (3Dfx Glide, Open GL and Direct 3D), giving gaming enthusiasts the most 3-D accelerated gaming support.

For more information on these 3-D video cards:

ATI Technologies	**3Dfx**
http://www.ati.com	**http://www.3dfx.com**

New Joysticks from Logitech

By Rod White

When it's time to sit down with your favorite flight/combat simulation, and you don't have a good joystick, chances are that casual flight over Chicago or that combat sortie over Baghdad isn't as thrilling an experience as it should be. As a continuing feature, we are keeping our eye on the latest and greatest entries in the simulation peripherals market. This time we are looking at the very latest flight gear from Logitech.

Not solely a mouse manufacturer, Logitech has been making joysticks for many years now. The WingMan and WingMan Extreme are their oldest and most recognized designs. These offered impressive features, but also left room for improvements. Last year Logitech refined the WingMan design and re-launched the entire WingMan series with many new products, including gamepads and racing wheels. The WingMan Interceptor was, at the time, their top-of-the-line gameport joystick device. And for a gameport device, it is still a great product today.

WingMan Extreme Digital 3D

Now it's a year later, and Logitech has revived the WingMan Extreme as the WingMan Extreme Digital 3D (WED3D). The WED3D looks nothing at all like any of the previous WingMan designs. It is a completely new stick, and I like this.

Installation is as easy as can be. The WED3D can connect to either a USB (Universal Serial Bus) connection or a gameport! At the end of the connection cable you will find a gameport connector with a USB adapter on the end. If you want to use it as a USB device, just leave this adapter in place, plug it in and insert the driver disk. Soon it is ready for calibration. As a gameport device, the connection is just as easy—simply remove the adapter. It's all a matter of preference.

Logitech's USB and standard gameport adapters

I prefer using USB devices, because they bypass the gameport and go directly into your operating system. The gameport interface has historically been the flakiest point of connection between you and the simulator. Always check to see if your computer has a USB connection when you're selecting a new peripheral device.

The WED3D features:

- A brand-new grip design
- Single eight-way hat switch
- Four buttons on the grip, two on the base
- Throttle lever
- Trigger
- Twist-action rudder control

The rudder control is a feature that all of Logitech's previous designs lacked, so this is a very nice addition that has been long overdue. Another great feature is the locking handle, which essentially locks out the twist-action rudder support, so you don't have to use the rudder functionality if you don't want to. Some enthusiasts may take advantage of this feature, because I've found on more than one occasion that I was using rudder when I didn't want to while

The WingMan Extreme Digital 3D

yanking and banking in the middle of a hairy dogfight. Many simulation enthusiasts have adjusted just fine to a twist-action rudder control joystick (like the MS Sidewinder). But some enthusiasts, like myself, are just too accustomed to using pedals and not worrying about twisting while madly wrenching the stick. It's a great option to have on the stick, and the majority of simulation enthusiasts will have no problem with the rudder functionality.

It is nice to see that Logitech realizes the frustration a twist-action grip can cause by incorporating a lockout option. My only gripe is that the screw you are required to turn is plastic, and I can foresee the possibility of wearing out or stripping this screw after turning it too many times. A metal screw would have been a much better choice. In terms of its functionality, the twist-action rudder support works great and is very precise. I have used it in several simulators without incident.

The throttle lever also works great. Like the rudder support, it is very precise and feels great to use, since it is in the right spot where you can easily reach it with your left thumb.

The movement of the control stick feels good, too. It offers just the right amount of tension and is not weak or too easy to move by accident, while it's also not so hard to move that your forearm will get a workout after sitting down with it for a few gaming sessions.

The grip is very comfortable to use for long periods of time, but like the previous Logitech WingMan products, it is still designed to accommodate right-handed gaming enthusiasts only. Although the handle is made of plastic, it does not have that plastic-like movement feeling to it.

All of the buttons are placed strategically on the unit. Your right thumb can reach all of the buttons and the eight-way hat switch with ease, and your left hand can easily manipulate the two base buttons just as well. The base of the unit is fairly heavy and stable, with rubber feet so it can't be toppled too easily.

The WingMan Extreme Digital 3D profiler software

Like the earlier WingMan products, the WED3D is easily programmable via the included *WingMan Profiler* software. All the buttons are programmable, and you can also specify properties for the "X" and "Y" axes and the throttle and twist-action handle. You can also program any of the buttons to be a "shift button," which essentially allows you to double the functionality of all the other buttons. Simply hold down the "shift button" while pressing another button to achieve another effect.

A decent online help system is provided as well, which can help you refine the included profiles or ones you've created on your own. All in all, it's very easy to program. However, in this day and age, you usually will not need to program keyboard keystrokes to buttons, because 90% of the new Win95/98-native simulators feature built-in button assignment configuration utilities. I have been able to do all the configuring I needed within the latest general aviation and combat simulators without ever needing to touch the profiler. But it is an option that's very easy to use when needed.

Conclusion

As a performer, the WingMan Extreme Digital 3D worked very well, and the feel and movement of the stick were excellent in everything from flight simulations to driving games. Here is the best part: the WingMan Extreme Digital 3D is priced at $39.99 MSRP, which means you might be able to find it for around $35 if you shop around.

The WingMan Extreme Digital 3D is truly a fantastic option, especially if you are ready to replace that tired old joystick that's difficult to keep calibrated. With six buttons, a trigger, throttle and rudder control, programmable functionality, the ability to use it as a USB or gameport device, and a price that just can't be beat, you really can't go wrong with the WingMan Extreme Digital 3D from Logitech. Without question, this may be the best stick they've designed yet.

WingMan Attack

Now that we have looked at Logitech's latest top-of-the-line offering, let's look at their budget-priced stick, the WingMan Attack.

This is also a new product from Logitech. The WingMan Attack features four buttons and a throttle dial. The base and grip are essentially identical to those found on the WingMan Extreme Digital, minus the extra buttons and hat switch.

Installing the stick is a little different, as no driver disk is provided for the WingMan Attack. Instead, you are instructed to select the generic "3-axis 4-button" driver provided by Windows, which is not a bad thing.

We put the WingMan Attack through a workout with the same titles we tried with the WED3D, and the results were about the same. The WingMan Attack worked well. The movement of the stick felt almost the same, the throttle lever is identical, and the only things I missed were the eight-way hat switch, rudder support and the extra buttons found on the WED3D.

Conclusion

Overall, the WingMan Attack is a very decent four-button joystick with a throttle. However, it is more of a casual simulator enthusiast's stick due to the features it lacks. Like the WingMan Extreme Digital 3D, the WingMan Attack doesn't break the bank either. It is priced at $19.99 MSRP, so you should be able to find it for as low as $15 if you shop around, which is a very good price for a stick that works this well.

For More Information

Logitech, Inc.
6505 Kaiser Drive
Fremont, CA 94555
Telephone: 1-800-231-7717
Website: http://www.logitech.com
SRP for Extreme Digital 3D: $39.99
SRP for Attack: $19.99

Web Watch

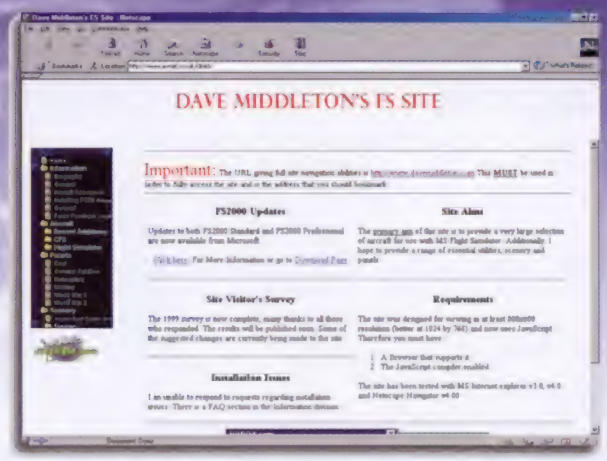
Internet Sites for Simmers

by Adam Howe

Welcome aboard the Web Watch Express for a four-stop flight journey through the Net. Today's flight will take us through Microsoft's Flight Sim world, the Combat Flight Sim world and we will even make a stop at a *Flight Unlimited III* page. So, to avoid unnecessary flight delays, I ask that you now place the oxygen mask you see suspended from the ceiling over your mouth and log on. We're goin' in!

David Middleton's FS site

If you glance out the right side of the airplane, you will see our first destination at http://www.davemiddleton.com. This link will take you to a welcome screen, where you will need to click "Enter" to access the main page. On the main page you will find a list of items on the left side of the screen for you convenience.



The site contains a lot of useful information for CFS, FS 98 and even FS 2000, as well as aircraft, scenery, panels, sounds, utilities, an image gallery and a page of links. The aircraft are organized into sections: Recent Additions, CFS and Flight Simulator. Under Recent Additions, you will find listings for the past few months. Under CFS, you can find the available aircraft listed by country. For Flight Simulator aircraft, the aircraft are sorted by country, manufacturer or an "Other" category for different planes. The organization of the aircraft helps surfers to easily find what they are looking for.

— Continued on page 79

Flanker 2.0

Reviewed by Rod White

Combat simulations come in a few different flavors: hardcore, light and middle of the road. Light combat simulations are typically light on realism and heavy on action and ease of use. *Jane's USAF* is an example of a middle of the road simulation that offers a fairly medium level of realism and is light in overall complexity, making it easy for novice combat simulation enthusiasts to enjoy.

A hardcore combat simulation pulls no punches when it comes to realism and complexity, and most hardcore simulations come with very thick manuals that are required reading. In 1995 SSI released *Su-27 Flanker*, one of the most hardcore combat simulations released since *Falcon 3.0*. Soon after, version 1.5 updated *Flanker* with improvements and very stable multiplayer support.

To this day, many combat simulation enthusiasts still fly *Su-27 Flanker 1.5*. Many consider it the ultimate hardcore combat simulation, due in part to the excellent avionics and flight modeling. On the flip side, it was a very tough combat simulation to master because it was such a complex and hardcore combat simulation. Further adding to the challenge was the fact that the entire heads-up display (HUD) and cockpit was in Cyrillic, so just learning the basics was a challenge. The Flanker is a Soviet-made plane, and while Russians have a tendency to make excellent aircraft, they're not known

A TU-142 Bomber in Flanker 2

for making them as pilot-friendly as their Western counterparts (F/A-18, F-16C, F-22, etc.). Now SSI and the Fighter Collection have released the long awaited sequel to *Su-27 Flanker*, *Flanker 2.0*. Like the first Flanker, a Russian development team coded *Flanker 2.0*, which is mainly why they were able to simulate the Su-27 Flanker as well as they have.

One of the complaints many simulation enthusiasts had with the first *Flanker* was its lack of textured terrain graphics. It was essentially a very clean shaded polygon engine, with very plain and simple graphics. Due to this design, the sim played nicely even on low-end machines, but it really could have used a little more eye candy. *Flanker 2.0* addresses this concern, featuring superb photo-realistic terrain of the Crimean Peninsula. The graphics engine behind *Flanker 2.0* uses Direct 3D to drive the 3-D accelerated graphics, and resolutions as high as 1,024x768 in 32-bit color are supported. To please the classic *Flanker* enthusiasts, *Flanker 2.0* offers the option to drop the texture-mapped terrain. This boosts the performance level for low-end machines, while also giving it a look very close to that of the original *Su-27 Flanker*. Other new visual features include fantastic explosions, smoke, missile trails and some neat environmental effects, like thick overcast and fog effects. *Flanker 2.0* also features many different camouflage schemes for the Su-27 and Su-33 aircraft, including one for the Russian Knights aerobatics team.

The big question most simulation enthusiasts have is "Will it run smoothly?" I've been running *Flanker 2.0* on a Pentium III 550MHz rig, and with all of the detail options turned on at 1,024x768 resolution in 32-bit color. I've only noticed a few slow downs in largely populated areas and in dense fog. *Flanker 2.0* can be very demanding with all of the detail options cranked. I also ran it on a PII 350MHz, and with a little tweaking, I've been able to enjoy it on that machine as well. I highly recommend a moderately fast PII-class system if you plan to run it with the terrain textures turned on. I also suggest at least a Pentium 166MHz-200MHz MMX-class machine if you plan to run with the terrain textures off for decent performance, but most simulation enthusiasts will never want to turn the textures off once they've seen them. In the cockpit, 3-D sound effects are now present, and if you didn't select the US HUD option, you'll even hear audible warnings in Russian. *Flanker 2.0* sounds as good as it looks.

The gameplay options include Single Mission, Campaign, Instant Action, Training and Multiplayer. I highly recommend starting with the Training missions in *Flanker 2.0*, as you'll really need them if you want to learn the basics. The Flanker truly operates like no Western fighter plane you may have flown in other hardcore combat simulations. The Soviets are known for creating fantastic combat aircraft, but they don't build the most pilot-friendly cockpit interfaces. Flying the Flanker almost requires learning how to fly combat simulations all over again, as switching the radar on, selecting a short range missile and unleashing it takes a

(Top)
The Crimean Peninsula never looked better!

(Center)
The amazingly detailed cockpit of the Flanker is a wonderful sight.

(Bottom)
Two F-14 Tomcats ignorant of what's to become of them.

(Top)
Loaded for Eagle, Falcon and Tomcat

(Center)
The Training Menu that Flanker 2.0 offers

(Bottom)
That's what I close formation flying!

few more steps than it does in *Falcon 4.0* or *Jane's F-15*, for examples. The Flanker features many unique HUD modes, one of which allows you to feed data directly to the missile's seeker head—then and only then can you unleash the deadly payload upon the Flanker's prey. This mode really comes in handy when your radar goes down, and believe me, radar failure is just one of many different system failures that are modeled in the simulation.

The Training missions feature audible instructions and real-time examples via a virtual instructor. At any time during these missions you can press the *q* key to take control of the plane. This gives players the chance to watch and learn, then to try the lesson first-hand. If you're not a veteran Flanker simulation pilot, do yourself a favor and fly the Training missions first. Everything from very basic flight and spin recovery tactics to weapons deployment for air-to-air and air-to-ground modes, and even carrier operations, are detailed in the Training missions.

The *Flanker 2.0* interface's Russian design doesn't feature the fluff or user-friendliness of the Jane's titles or even *Falcon 4.0*, but it's clean and functional. The interface for selecting the missions looks like Windows Explorer, as selecting a mission is done just like selecting a file from a folder. Many folders offer selections for air-to-air, air-to-ground and head-to-head situations, with sub-folders for average and hard difficulty. The classic *Su-27 Flanker* featured a very complex mission editor and map tools. *Flanker 2.0* does also, only it's been tweaked a lot for this new version. Once you've selected a mission, you can change or modify items in the editor, switch the mission recorder on/off or simply take flight, among other options. Such a powerful set of tools included with the simulation ensures very high replay value. This time you can even include audio .WAV files in the user designed missions, which allows you to create your own training scenarios for complex fighter maneuvers and tactics.

The Campaign included with *Flanker 2.0* is roughly 35 missions long and takes place over the Crimean Peninsula region. SSI claims it's a semi-dynamic campaign, which is essentially a bunch of branching, scripted missions. It also tracks some of the elements from mission to mission, like a destroyed bridge will still be rubble if you fly over it again in the next mission.

Instant Action is essentially that, and in Instant Action you can select from a few cheats, like being Immortal and having Unlimited Ammo. Instant Action is fun, but because the simulation is so complex, it's not as fun or easy to jump into as the Instant Action function in most other combat Simulations. But, it's a nice place for novice Flanker pilots to cut their teeth before taking on the more complex Single Player or Campaign missions. *Flanker 2.0* also offers two variants of the Flanker to fly in this sequel. The Su-27 Flanker is modeled in great detail, and so is the naval variant, the Su-33. The Su-33 features canards, heavier landing gear and more robust air-to-ground capabilities, including the capacity for air-to-ship operations.

The Su-33 can also launch from carriers, so carrier operations are part of *Flanker 2.0*, and what a thrilling experience it is to deploy from and land on carriers in *Flanker 2.0*.

All the proper weaponry is offered in the simulation. This also requires a little learning beforehand, as determining the best short-range missile and the proper medium- and long-range missiles for each task requires a little patience and a lot of reading up on them in the manual. The training missions also help in this area. While most combat simulations focused on aircraft like an F-15, F-16 or F-22 only use two or three different air-to-air missiles (Aim-9, Aim-7 and Aim-120), the Flanker features a wide variety of air-to-air weapons for different ranges and situations. Additionally, the air-to-ground arsenal in *Flanker 2.0* is filled with loads of devastating payloads. Between the two Flanker variants (Su-27 and Su-33), you'll find very few types of missions that can't be flown by the Flanker.

Last but not least, *Flanker 2.0* provides hardy multiplayer over Internet and LAN via TCP/IP protocol. Over the Internet, SSI claims that a good eight-player game is feasible, even on a lowly 56k modem, and those with DSL and cable modems might be able to host competitive 16 to 20-player games of *Flanker 2.0*. SSI acknowledges that the performance may drop a notch or two when adding AI to the mix, but competitive head-to-head and team encounters should run nicely even for those on dial-up 56k connections to the Internet. Not only is *Flanker 2.0* a fantastic combat simulation, it also has robust multiplayer options. SSI also includes a free copy of Resounding, Inc.'s *Roger Wilco*, which is an Internet voice application that allows you to speak with other players over the Internet while playing multiplayer games. I've tried *Roger Wilco* in the past with other games, and for the most part it works very well and operates very much like an Internet walkie-talkie.

Conclusion

There's no question about it—*Flanker 2.0* is a very challenging and complex combat simulation. The Training missions, manual and options help novice simulation enthusiasts, but *Flanker 2.0* still is a very hardcore combat simulation offering a level of complexity that only the extremely hardcore combat simulation enthusiasts can master. Sure, someone looking for a few quick thrills can jump into Instant Action mode, but that gets old really fast in *Flanker 2.0*. The meat of this simulation is in the single mission and campaign modes of the product.

(Above)
A Flanker stalking its prey

(Below)
Just one of the many camouflage schemes for the Flankers

Flanker 2.0 offers no arcade flight model, which is a good thing, and the flight model is by far one of the best, if not the best found in a modern PC combat simulation. It offers the right balance of inertia and fluidity for a sensation of true flight, which is something missing from many of the combat and flight simulations on the shelves today. There's nothing quite like hugging the ground and weaving through the mountains in *Flanker 2.0* or attempting to master aerobatics maneuvers in Russia's finest combat fighter aircraft. You can even perform the notorious Russian Cobra Maneuver in *Flanker 2.0*, if you're good enough.

Some things could have been done better in *Flanker 2.0*, as a few little glitches are present, but I can't think of any combat simulation on the shelves today that debuted without a few. SSI and the Fighter Collection are dedicated to the project, and *Flanker 2.0* is a very community-driven product to begin with, as *Flanker 1.5* has a huge and very vocal following.

I have a notion we'll see a patch surface soon to address some of the minor issues present in the final shipping product, but none of the flaws are show stoppers that hinder the ability to play and enjoy the simulation. My only other gripe is that the objects and units on the ground don't move. However, an expansion pack is already planned for *Flanker 2.0*, called *Su-39*. *Su-39* will bring the Su-25 Frogfoot and its naval variant (the Su-39)—essentially Russia's answer to the A-10—into the *Flanker 2.0* world. I suspect they'll be adding a lot more to the ground in *Flanker 2.0* for it. The way it stands, even without moving targets, *Flanker 2.0* is still a fantastic hardcore combat simulation.

Flanker 2.0 boasts very in-depth avionics and complex flight modeling, challenging missions, topnotch graphics, good multiplayer options, powerful mission editing tools and a challenge level all its own. This is a simulation of one of Russia's finest, if not the finest, aircraft they have to offer.

Flanker 2.0 is definitely not the combat simulation for everyone. However, *Flanker 2.0* is certainly more accessible than *Flanker 1.5* and the original *Su-27 Flanker,* due to the addition of well-designed Training missions and the inclusion of a detailed and hefty manual. *Flanker 2.0* was in development for well over two years, and from the look of things it was truly well worth the wait.

Breaking in the Su-33 naval variant of the Flanker

For More Information

Strategic Simulations, Inc.
A division of Mindscape, Inc.
88 Rowland Way
Novato, California 94945
http://www.flanker2.com

Turkish F-16 (below left) and Mig-29's ready for takeoff (below right)

A Look At MIG Alley

We've had the opportunity to fly many military aircraft in recent simulations. WWII-era props, the F-16, F/A-18 and the high-tech F-22 have all made appearances. We've even flown open-cockpit, canvas-winged WWI flying machines on our PCs. However, the dawn of jet-driven air combat has been overlooked for years now. The 1950s spawned a conflict that is continually overlooked by many. The Korean War was truly the dawn of the modern jet fighter pilot. To fill this void, the UK-based combat simulation developers Rowan teamed with Empire Interactive again to create *MiG Alley*.

A very in-depth mission planning interface

At long last, *MiG Alley* is complete after being in development for a good while now. It was actually one of the first combat simulations for the PC to debut mirror imaging on the cockpit canopy glass. Since then, having mirror images and glare on cockpit canopies has become a standard feature in PC combat simulators.

Although *MiG Alley* is not new to simulation fans in the UK, it only debuted in North America on December 15, 1999. Why did they wait so long to release it in the US? Empire claims that they wanted to polish it a little more and make certain that the multi-player features worked better. This is usually the case with a product that is released first in the UK, then six months later in the US.

Game Options

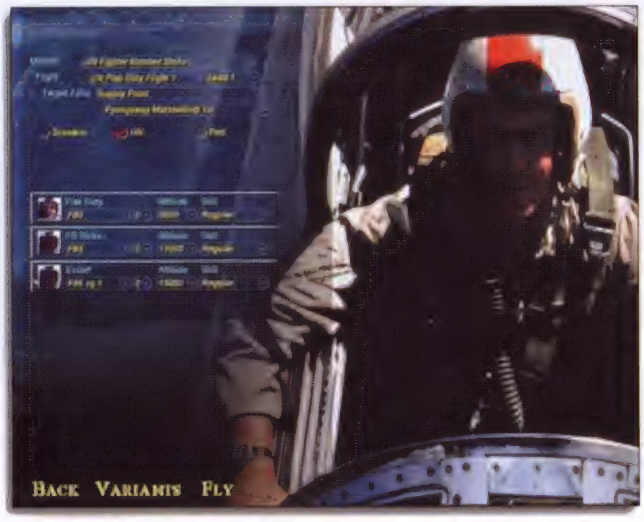
Hot Shot, Quick Mission, Campaign and Entire War are the gameplay options available under the Single Player menu option. Multi-player options are also provided, including traditional Deathmatch and Team Play/Quick Mission mode for IPX, modem, serial port and Internet play.

Digging around in the Campaign selection brings up a sub-menu that allows you to choose from five historical campaign scenarios:

- North Korea Invades
- The Pusan Perimeter
- Breakout/To the Yalu
- Chinese Intervention
- Spring Offensive

These mini-campaigns are all designed to prepare you for the Entire War mode. Entire War drops you into the battle as it beings in June of 1950. It is the largest scale dynamic-campaign scenario option in the program. This is where most simulation enthusiasts will spend their time, after honing their skills in the mini-campaigns and in the Hot Shot and Quick Mission sections.

A quick glance at the Quick Mission menu reveals a wide variety of mission types to fly, each of which has different variables that can be modified before taking flight. In all, you will find sixteen different missions. In eight of them you can fly MiGs against Sabres and a variety of fighter-bomber aircraft.



The Quick Mission interface

Hot Shot is essentially the instant action option. It starts you in the thick of things, with bogeys a few miles from your starting position. But, this mission can last a long time, because the onslaught of incoming enemies is almost never ending. Most simulation enthusiasts will spend a lot of time in those two sections of the product; this is where I found myself spending the majority of my time. Those missions are very easy to get into, and they are so much fun to fly.

Well-done terrain graphics, with lots of ground objects

In the realism department, *MiG Alley* can be considered a middle-of-the-road hardcore combat simulation. Casual simulation enthusiasts can figure out *MiG Alley* in a few sittings. At the same time, it offers enough realism options to keep hardcore enthusiasts interested for weeks on end, especially after diving into the dynamic campaign scenarios.

MiG Alley's flight modeling does not disappoint, either. Options are provided for Easy or Realistic flight models, with a boatload of additional flight-related options to choose from. So, *MiG Alley* is easy for greenhorns to master and challenging enough to please enthusiasts who demand ultra-realism.

3-D Graphics

Graphically speaking, *MiG Alley* is appealing, though not breathtaking. Gameplay resolutions range from 640x480 to 1,600x1,200, and the simulation runs nicely at 640x480 on a low-end PII-class machine. All of the planes look nice, and damage is represented visually very well, as different degrees of damage appear as you are pelted with gunfire by enemy aircraft.

At times you may even get to watch a wing (or two) and other parts of the airframe fly off after taking damage. The terrain detail is also worth mentioning, as entire cities, bridges and even trees are visually represented on the ground very well. The ground terrain itself is built using satellite photography and aerial maps of the region, and Empire claims it is accurately recreated down to ten meters. Up high it certainly looks impressive, and down low it becomes a little less appealing to the eye, although it does not look terrible by any means. Over all, the graphics look great, but it could look a bit sharper in the higher resolution modes, and the explosions leave a lot to be desired.

Dive, dive, dive!

Aircraft

The best thing *MiG Alley* has to offer is its variety of aircraft. You have a wide selection of planes to pilot in the simulation:

- F-80 Shooting Star

- F-51 Mustang (so named when USAF changed from the "P" to the "F" designation for fighter aircraft)
- F-84 Thunderjet
- F-86 Sabre (three variants)
- MiG-15 (two versions, including the BIS).

Making the transition even easier from plane to plane, the mini-campaigns force you to fly a specific plane through each one, so by the time you reach the end of the final one, you will have learned to master them all. What's more, you encounter additional planes during missions, like the F4U Corsair, Yak 9, B-29 and the F-82 Twin Mustang (one of the must unique prop aircraft you'll ever lay eyes on, as it's essentially two Mustangs bound together), just to name a few.

View of mirror image on the cockpit canopy

Another feature that helps immerse the player is found within the cockpit during flight. An amazingly in-depth communications system is in place to interact with your wingman, FAC and other allied AI (Artificial Intelligence) aircraft. Pressing the [R] key brings up the communications menu. Here you can select from Group Info, Precombat, Combat, Post Combat, Tower and FAC (Forward Air Controller) sub-menus.

Group Info offers selections for Call in, Call position, Fuel check and Status report commands. The Precombat sub-menu brings up Test Guns, Jettison Stores, Jettison tanks, Spread Out, Close up, Bandit activity, Nearest bandits and Patrol area selections. Combat features are Give freedom, Take command, Nearest bandit, Break!, I'm padlocked, Six Clear and Not Clear!

In the Postcombat sub-menu you will find May Day, Home Tower, Nearest Tower, Surface Wind, Wind at 35,000ft, Land at home and Land at nearest selections.

The FAC sub-menu selections include Begin your run, Lost FAC, Re-mark Target, Missed, More Targets and Leave area selections. The interaction with your wingmen is also a treat, as unique voices depict each one when they reply after you've issued various commands to them.

A Sabre on the prowl

In many of the missions, the Forward Air Controller (FAC) also comes into play. You actually see them spotting the ground threats for you with smoke, which is a feature you don't find in combat simulations these days outside of the Vietnam scenarios found in *Jane's USAF*.

Conclusion

Rowan and Empire Interactive have created an excellent and thrilling combat simulation. *MiG Alley* features multi-player options, but it is not the greatest performer over the Internet. Over a LAN, however, it can be a great deal of fun head to head or cooperatively as a team. You can even engage in the Quick Mission scenarios competitively or cooperatively, with or against the AI pilots. Unfortunately, they were not able to add the functionality to play the campaigns that way. But nonetheless, it is fun and it works fairly well over a LAN.

If you are interested in solo combat simulation action against excellent and sometimes unpredictable AI pilots, with great graphics, a wide variety of planes and challenging scenarios, *MiG Alley* is certainly well worth the price of admission.

For More Information

Empire Interactive
580 California Street
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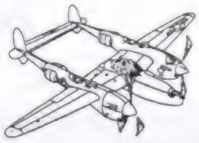
http://www.empire-us.com

Aviation Models

Desktop Display Models. See our on-line catalog

www.aviation-models.com



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And while you're on the web, visitl the Ghost website (http://www.ghosts.com/).

MicroWings Conference

Coined as "Flight Sim Heaven for 3 Days" MicroWings, The International Association for Aerospace Simulations has announced plans for their annual flight simulation based conference that is slated for May 18-21, 2000 in Seattle, WA.

The Seattle area is home of Microsoft Flight Simulator team, Boeing Airfield, Flight Safety International, Seattle Museum of Flight and many other aviation based facilities.

The conference will take place at the DoubleTree-Bellevue Hotel. It's located only a few minutes from most of these areas of interest.

MicroWings conference will be host to many of recognized names in flight simulation where you will be able to see and test some of the newest flight simulation hardware and software as well as finding out the latest news in development from your favorite vendors.

Besides the conference, many special tours will be available to the many local sites such as:

- Seattle Museum of Flight,
- Learn about flight training at Flight Safety International
- Factory tours at Boeing Plant
- Alaska Airlines training facility
- Seaplane flights around the Seattle area

Microsoft will also be hosting a special developers meeeting (DevDay). Those signing up for DevDay will be provided transportation from the conference hotel into the heart of the Microsoft Campus itself to spend the day with the Flight Simulator 2000 Development Team. You'll get to hear presentations and question & answer sessions on various aspects of developing add-ons for Flight Simulator 2000.

In addition, you'll have lunch with the Development Team and an opportunity to visit the on-campus Microsoft Museum and the Microsoft Gift Store.

Cost to attend the conference is $399.00 for non-members and $369.00 for members. Members who register before March 31st are eligible for a $40 discount from the conference cost. Additional charge of $100.00 is required to attend the Microsoft DevDay event.

For More Information

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Product Reviews

Reviewed In This Issue:

Intercept Trainer 2000
German Airports 3
Geneva 2000
The Legendary Aircraft Collection
Creatools

Intercept Trainer 2000

By Phil Pashutine

IFR flight training devices are no longer rare and expensive. This, fellow flight simmers, is really good news. Some very good IFR trainers cost as little as $90 and have all the elaborate features you find in the expensive trainers, such as a flight data analysis window, digital elevated terrain model, aircraft with generic or photorealistic panels, state-of-the-art flight planners, up-to-date airway, reporting point and navigation data, etc. These flight-training devices can be used in two ways: for basic/advanced IFR training and to maintain proficiency. Many non-real-world pilots who use flight sims haven't a clue about how to track/intercept a VOR/NDB. Most of the time, they rely on the autopilot or the GPS. Some excel at this, but they are lost when the A/P or GPS fails (in a programmed adventure or because of a bug, for examples).

Instead of blaming the onboard electronics, do yourself a big favor and practice basic navigation. We can always reset the flight in flight simulation, but this is not an option in real life. Since some flight simmers out there will one day take flying lessons, now is a good time for them to learn the correct way to fly. Remember that private pilots do not fly the heavy irons and that small GA aircraft have only basic navigation instruments, not a glass cockpit with powerful computers. The only computer in a small aircraft is your brain, and navigation involves a lot of mental calculus.

Intercept Trainer 2000 (IT2000) is a flight simulator used by flight schools and IFR students. Its sole function is to enable you to practice VOR and/or NDB interception.

Intercept Trainer 2000 requires no lengthy installation. Just copy the executable file to the directory of your choice and launch the application. The 22-page manual (in MS Word .DOC format) details each of the program functions. *IT2000* doesn't come with basic navigation tutorials, so I advise you to download those from the Internet or buy training books from ASA or Jeppesen.

The Main Screen

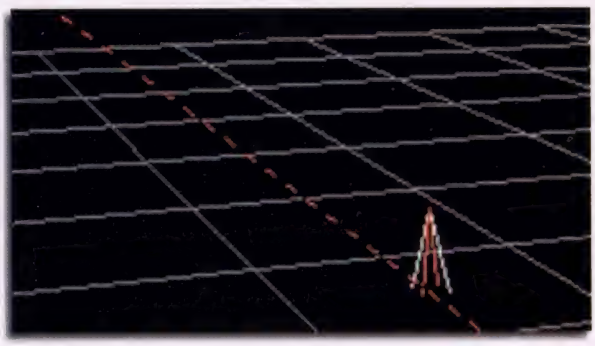
Intercept Trainer 2000's main window is divided into three sections: Outside view, Instruments and Options. It can be resized to display a larger Outside view (6 x 2.4 inches and 8.38 x 4.25 inches full window). Whatever your window size, the instruments remain the same size (2.25 x 2.25 inches).

Outside view

Click on any of the four views tab located under the Outside view display to use either Spot view, Cockpit view, Navaid view or Blind view. The bottom section is the primary instrument display, and the section to the far right is for the options.

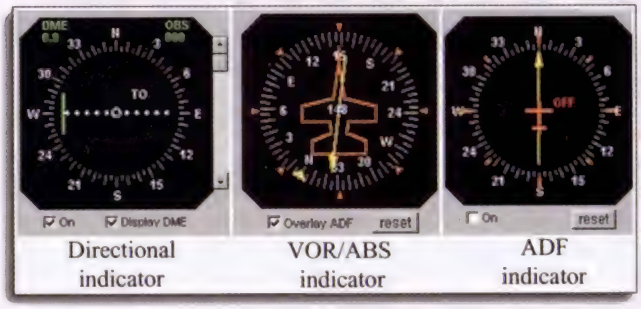
Underneath the views tabs are two sliders that enable you to control the pitch and zoom factor of the *IT2000* world. *IT2000* includes three co-located NDB/VOR stations. Two of them are illustrated by red and white beacons. The third beacon is invisible and activates when you switch to Random mode.

Instead of the plane, the Intercept Trainer world can be dragged to another location. This is a bit odd at first, but you get used to it. To position a station as far away as you can, drag the IT world to one side beyond the Outside view. It won't show in the Outside view, and depending on the zoom factor used, your DME can be up to 250 nm away (the maximum Omni radial display range is 62.6 nm).



Three Primary Instruments

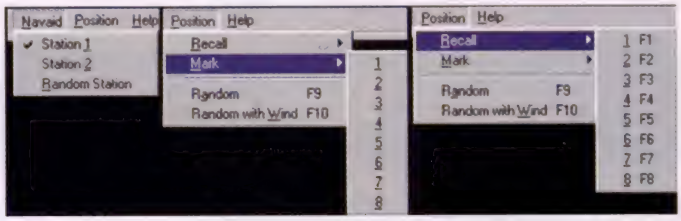
To help you find your way, *IT2000* offers three main instruments: the directional indicator, the VOR/OBS and the automatic direction finder (ADF). The directional indicator shows your current heading (HDG can also be read in the center of the DI), and you can include the ADF overlay. The heading bug is mouse adjustable and can be reset to north. The VOR/OBS and ADF indicators can be used individually or together (partial panel). DME indication can be switched off, and the VOR NAV flag shows when you are less then 0.1 nm from the navaid. The OBS can be adjusted with the mouse or the vertical slider (in steps of 5 or 10). The ADF compass is rotated with the mouse and can be reset to show north.



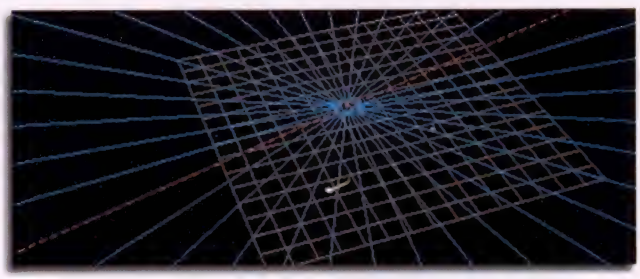
The three primary instruments in IT 2000 to help you find your way

Options

You can save and recall up to eight positions. The aircraft can be positioned randomly, with or without wind.



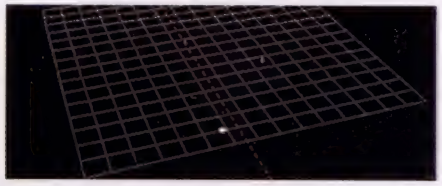
IT2000 can be controlled with a joystick or the numerical keyboard keys. It has visual cues like aircraft tilting over the station, a grid, a compass rose, an Omni radial display and a track mode. Other options are Save and Recall speed buttons, a wind speed and direction window and a timer to record your flight time or to use when practicing instrumental holds. All the options can be toggled on and off, and the visual cues can be displayed separately or together.



Although *IT2000* can be "flown" with the keyboard keys, I recommend using the joystick because you can increase or decrease speed with a simple push/pull of the stick (speed ranges from 0 to 600 kts) and turns will be limited to "Rate 1" only. If you use the numeric keyboard keys, keys [8] and [2] are used to increase or decrease speed in 60 kts

increments, and keys [4] and [6] turn your aircraft (not limited to rate one turns). Speed can be saved and recalled for later use.

Using and interpreting the instruments correctly may take some time so *IT2000*'s visual cues come as a big help. A 15 x 15 grid marks the immediate IT world where the two VOR/NDB station are located. (Each grid tile is roughly 0.5 nm square.)



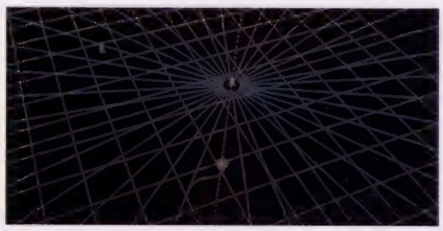
15x15 grid

Seeing the Omni radial is truly helpful when learning basic navaid interception.

The Omni radial

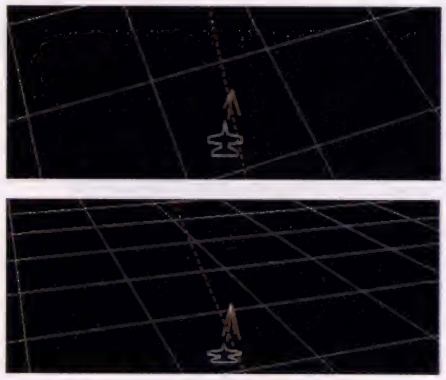
Display it by pushing one of the joystick buttons or checking the Omni display box in the simulator's options. The compass rose overlay is useful when executing equi-distant heading changes, lead in turns, DME arcs, etc. The rose doesn't show up well at small heights, so you'll need to raise the view.

In Spot view, when over the station, the aircraft can tilt over it, giving you an overhead view of the station.



Spot view

The following screenshots show both tilt and non-tilt views:



Tilt and non-tilt views

Wind speed and direction can be adjusted in the little window to the right by dragging and turning the mouse in the window or by using the sliders. Wind speeds range from 0-99 kts. If you wish to work with an unknown wind component, ask a friend or your instructor to set theparameters and uncheck the wind display. If no one is available, you can still do that by unchecking the wind display box, pressing the [F10] key (random station and wind) and then selecting your desired station and relocating the IT world if necessary.

I always select the Track option, because I want to see my flight pattern and verify that all my exercises were done by the book. Here's a bit of advice: start learning in Spot view, and use the None view when you are confident you can do the exercise without any outside reference or visual cues. While Spot view is acceptable at first, after a while it will become necessary to put yourself in 0/0 visibility conditions. Once you have finished an exercise, switch back to Spot view to check your flight track.

A simple work screen and readable gauges combined with interesting visual options make *Intercept Trainer 2000* a great learning tool for basic and advanced navaid interception.

For More Information

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German Airports 3

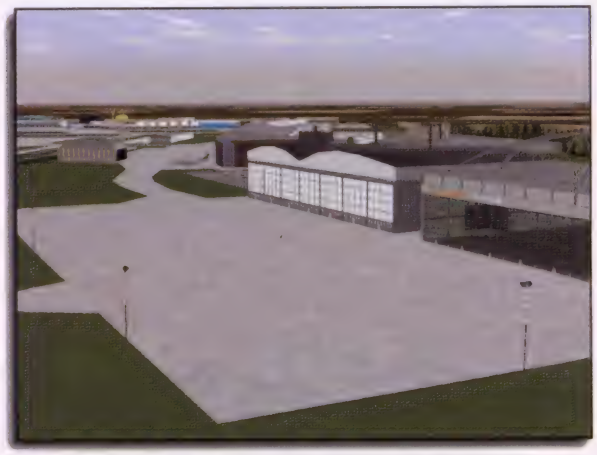
By Adam Howe

Following the release of *German Airports 1* and *2*, Aerosoft has continued success with their *German Airports 3,* which enhances Microsoft's Flight Simulator 95 and 98.

After following an automatic installation and starting Flight Simulator, I was on my way to enjoying the new *German Airports 3.* I found the new scenery to be very well done. I have used more scenery both downloaded and purchased than the average flight simmer, and I can say without crossing my fingers that the detail in *German Airports 3* is nothing less than astonishing.

Creating dynamic scenery (moving objects at the airports) can be a time-consuming process and a bit difficult to blend with scenery. Not only does *German Airports 3* include dynamic scenery, but the objects found in motion range from trucks to airliners. The objects used in the dynamic scenery are not only unique, but look great and are not plain two color trucks sliding around. The speed of the objects and their appearance looks great. Looking at the scenery during an approach gives a feeling of "airport life" that is rarely found in Flight Sim. Seeing the trucks scooting about the airport and jets pulling out of the terminal really shows the amount of attention paid to detail by the designers of *German Airports 3.*

The buildings at the airports are also amazing. If they are not based on real life, then there is a true artist at work behind the scenes of this scenery. Using transparent windows on buildings that allow you to see inside the building is a rarity in FS and helps to make this package an excellent FS add-on. Usually I set the Flight Sim to day while flying (because I can't read instruments very well!). When arriving at the airports, FS sets the time of day to night, and I could not believe my eyes. I was seeing a lighted interior of the airport buildings — I had not seen that before!



Signs on buildings are not new to FS, but are nice to see. Most add-ons I have used seem to shy away from signs. This is definitely not the case in *German Airports 3.* Every major building at the airports has a sign at the top (probably as in real life) identifying the building. This may not do much for an instrument rated pilot flying in and out of the airports, but it is nice for us sightseers.

The manual that comes with *German Airports 3* gives an approximated frame rate (the number of screens drawn by the video card measured in frames per second, FPS) for the scenery, which I found to be about right on. The package was tested on an AMD K6 300 computer with 100MHz Motherboard and a Diamond Viper 550 video card. I usually get about 40-45 FPS at Meigs field upon startup of FS98. At the airports in *German Airports 3*, I hit about 15-20 FPS with dynamic scenery and scenery complexity set to "Very Dense".

The airports included in *German Airports 3* are: Berlin Tegel, Bremen, Dusseldorf, Efurt, Kiel, Hamburg, Lubeck and Monchengladbach.

Dusseldorf Airport

In the *German Airports 3* box you will find two manuals, a registration card and a CD-ROM. One manual contains approximately 43 pages of airport diagrams and approach information from Jeppesen. This will come in handy if you are interested in flying the approaches and getting the most out of the package. The other manual is printed in German and in English and contains all of the system requirements, installation, troubleshooting and general information on runway lighting, dynamic/static scenery and scenery density. The back of the second manual breaks down the airports and lists the latitude and longitude, elevation, runway length and surface, radio facilities and general information. This information also comes in real handy for shooting an approach.

Overall, the package is an excellent add-on to FS. However, I did come across a few items that should be noted. The most noticeable problem I encountered was at Bremen Airport. As I moved around and took off, I noticed a terrible blurring of the scenery around the airport. I immediately consulted the manual for assistance and found mention of a blurring or streaking of the scenery. The situation given in the book did not pertain to my situation, and the problem still exists.

Since this was at only one airport, I can live with it, but having only eight airports — it takes a lot from the package. My next point concerns the number of airports. Eight airports may seem a bit weak, but the quality is nearly unmatched. The last point I found distracting was how you have to access the scenery in FS98. The scenery is accessed by using the "Scenery From 6.0 and Before" option in the FS98's **World | Go To | Airport** menu. With the technology available for FS, creating scenery that is accessed in the Airport/Facility Directory (AFD) in FS should not be a difficult task.

I understand that since FS95 does not use an AFD like FS98 that separate scenery would have to be used for the different versions of FS, but for ease of use, I feel the AFD should have been used for FS98.

I definitely will keep *German Airports 3* on my computer. Since it only takes up 15 MB, it will be worth it on those occasional trips I take to Germany!

For More Information

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or http://www.aerosoft.de

Geneva 2000

By Phil Paschutine

The beautiful city of Geneva, Switzerland is located near the Jura and the Alps Mountains, right on the banks of the largest lake in Central Europe. As this is some of the most spectacular terrain in the world, I was looking forward to reviewing *Geneva 2000* for Microsoft *Flight Simulator 98* (FS 98) and the *Flight Simulator 2000* (FS 2000) upgrade, *Geneva 2001*. Let's look closely at this add-on package to see what it has to offer.

St Peter's Cathedral is one of the major landmarks of Geneva.

Installation

As with the majority of commercial titles, installation is fully automated, and the user can choose from a full or custom installation. By default, the documents and landing chart folders are copied to the FS directory.

If you are installing for FS 98, you will need to make sure you have the Microsoft FS98PAT1.EXE and FSCONV98.EXE patches installed for FS 98. You will also need to manually install the scenery into the FS 98 scenery library.

If you do "upgrade" to the FS 2000 version (*Geneva 2001*), you will experience the most complicated installation procedure I have ever seen for a scenery add-on. First, you need to install *Geneva 2000* to FS 2000, then if you haven't already done so, you must patch FS 2000 with the appropriate Microsoft Standard or Pro edition patch before launching G2001PAT.EXE, which is the *Geneva 2001* upgrade. This file will unzip to a temporary directory. *Then* you must click on setup to install additional files to yet another directory! *Then* click on the patch icon and the files will be copied or deleted to upgrade *Geneva 2000* to *Geneva 2001*.

This is tedious, and Europeans have a saying that hits the spot: "Why do it simply when you can make it complicated?" When uninstalling *Geneva 2001*, you are left with several files in both the Geneva and Morocco scenery folders. You will need to rename the FS2000\Scenery.bak folder created by the setup program back to Scenery.cfg, so that the scenery area will be removed.

Documents and charts

If you choose to install the utilities and documents, the installation program copies these two additional folders to your main FS directory. The multi-lingual documentation comes in several formats (.DOC, .TXT, .RTF and .HTML).

- **Documents** deals with the history and other details of the "Moroccan stunt pilots patrol," also known as the "Marche Verte."
- **Landing charts** includes 12 landing charts in .BMP format, 12 VFR (Visual Flight Rules) landing charts of passable quality, one Boeing 737 flight plan from Geneva to Zurich, one map screen shot of the Geneva airport location, an ILS approach chart for runways 5 and 29 at Geneva, one STAR (Standard Terminal Arrival Route) chart for Geneva and a VFR transit route.
- **Utilities** include the Microsoft FS 98pat1 and fsconv98 patch files.

Aircraft

Geneva 2000 and *Geneva 2001* come with the same 24 aircraft. Some of them are good and some are not very good at all. I was very disappointed, as many of these planes displayed design problems and/or poor graphics. Although FS 2000 is very forgiving on polygon bleeds, you will find that several aircraft have gaping holes in the wings near the engine pods and funny outside windshield textures.

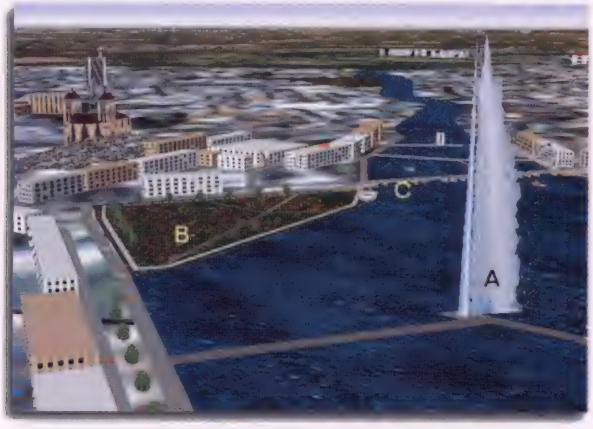
Of the 24 planes (in both versions), five of the jet and turboprop planes share the default FS 98 Cessna panel, which is quite an oddity. The remaining heavies use the FS 98 737 panels. The two "Forces Royales Air" Cap10 and 230 share the same custom panel, and the DR400 Robin has its own panel. However, these custom panels are, quite frankly, not very good for a commercial product.

Watch out for birds in the vicinity of the fountain!

Scenery

Geneva 2000 comes with two scenery areas, covering Europe and North Africa. They include the Geneva Airport, several French and Swiss airfields, and seven Moroccan airfields . ***Note for FS 98 users**: The default FS Africa boosters must be on.

I know Geneva fairly well, having stayed in the city many times. The major landmarks are included in *Geneva 2000*, and you will recognize the famous water fountain (A) located off Quai Gustave Ador. Between Pont MontBlanc (C) and Quai Général Guisseau, one will recognize the "Jardins Anglais" British Gardens, where the flower clock is (B).



The city of Geneva, with accurate landmarks

The night lighting is pretty innovative. It is random and not in lines, as we often see. The runway 05 night approach is quite a sight. Speaking of sights, try a panoramic two-hour flight over the Alps in a Classir Air DC-3. In FS 2000, the Geneva fountain now includes very impressive night lighting.

Go inside some of the *Geneva 2000* airport buildings to look at the interior decorating. Many of the scenery elements exhibit the designer's eye for detail.

I was very disappointed with the *Geneva 2000* Moroccan airfields and airports. It's a commercial scenery release, but they seemed to be of only average freeware quality.

Most of the *Geneva 2001* airports have flashing polygon effects, and some of the hangars appear misshaped. I have also seen double runways. It is quite obvious here that the designer left some very basic design issues unresolved.

The French airfields located on the French-Swiss border enhance *Geneva 2000*. Unfortunately, I have seen quite a few mountains disappear and reappear.

After upgrading to *Geneva 2001*, I went to several airports and found myself more than 10 feet *below* airport altitude. At Chambery the runway is two feet *above* ground level. Also, when you taxi out of the runway at Bellegarde, you will fall through the texture. At Annemasse, I taxied out of the airport polygon to park the aircraft; I fell 60 feet and admired the airport from below.

There are many hotels and other major city buildings in this scenery add-on. Again, the city itself is pretty well done. But *Geneva 2000* has quite a few disappearing buildings. This was tested on three separate computers, so I do not believe the video card is at fault. In fact, I installed *Geneva 2000* at least three times on each computer using a fresh installation of FS 98.

Conclusion

Although much of the scenery and aircraft are highly detailed, both *Geneva 2000* and *Geneva 2001* are full of basic design mistakes. This is unfortunate, as this could be an excellent scenery add-on for Flight Simulator. But unless designers fix the many bugs, this is one title we can not recommend.

For More Information

FlightWorld
http://www.flightworld.org
E-mail: info@flightworld.org
SRP: $38 for full version, $10 for upgrade.

The Legendary Aircraft Collection

By Adam Howe

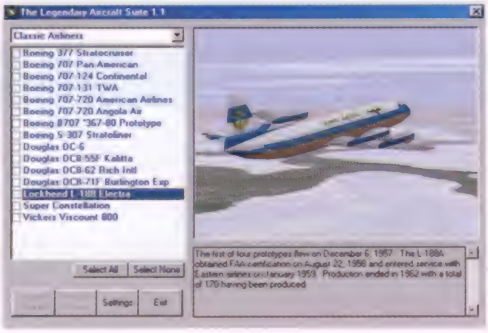
The Associates and Flight 1 Software have teamed up with the Virtual Skunks to bring a very eclectic collection of aircraft to FS98 users. *The Legendary Aircraft Collection* adds over 200 aircraft to your FS98.

Manual

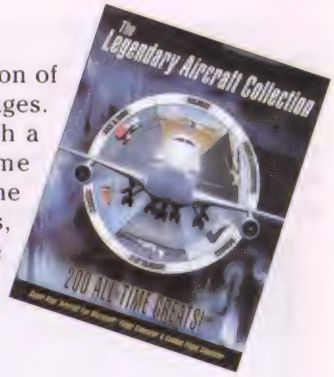
The handbook that comes with *The Legendary Aircraft Collection* contains a total of 90 pages. The book is written in German and English. Most of the manual is taken up with instructions on using the FMC Flight Planner which is a flight planning utility included with the program. The manual is broken into three basic sections: installation and general information, the FMC Flight Planner manual and Aircraft History.

The English portion of the installation and general information section takes up six pages covering installation, the "Aircraft Browser" (the interface used to install the aircraft), first time use, uninstalling aircraft, installing aircraft without the "Aircraft Browser," Flying Tips, contact information, information about the Virtual Skunks and acknowledgments. The manual is written in small type and is a bit strenuous to read.

The FMC (Flight Management Computer) Flight Planner section occupies about 20 pages of the manual. As mentioned on the first page "The FMC is a highly technical and complex area of the programme and the document below reflects this." They are not kidding. The FMC is difficult to use, but can be a handy tool once mastered.



The Aircraft History portion of the manual takes about 30 pages. Each aircraft is described with a paragraph or two and some screen shots of the plane. The planes are broken into groups, as is the installation of the program.



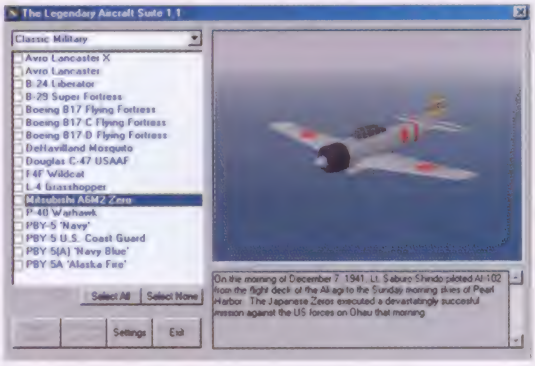
Installation

The installation of *The Legendary Aircraft Collection* was laid out very nicely. The setup breaks the aircraft into groups. By selecting a group, you are shown the available aircraft. Installing the aircraft involves placing a checkmark in a box in front of the aircraft's name and clicking the "Install" button. One mistake I made was selecting all the aircraft I wanted from each group and trying to install them all at once. This will not work. You have to install the groups separately. Each aircraft also has a preview image, so you can tell exactly what the plane will look like in FS.

The groups to choose from are:

Group	# of planes
Modern Airliners	87
Classic Airliners	15
Commuter-Regional	35
General Aviation	19
Modern Military	16
Classic Military	17
Aviation Classics	72

Total number of planes: 268. As the CD-ROM in the box says: "Over 200 beautifully rendered editions of more than 100 unique aircraft..."

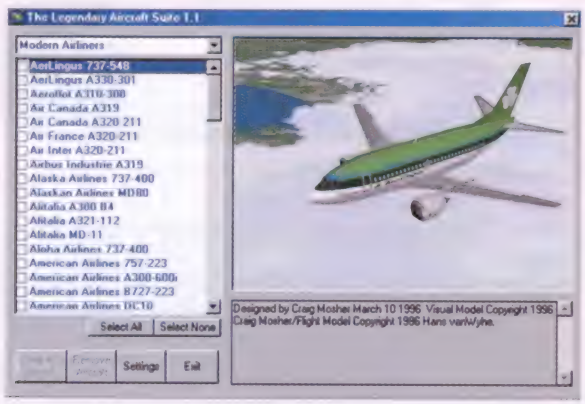


FMC Flight Planner

Included with *The Legendary Aircraft Collection* is the FMC Flight Planner utility. The manual for using the FMC Flight Planner seems bigger than FS98's manual, but it is a really neat utility. Most of the manual refers to possible error messages, so there is a high learning curve to it. Once you get the hang of it, it can be a pretty neat program.

The Aircraft

To be honest, I did not attempt to fly all of the aircraft in the collection. I did load them to be sure they operate, but I did not dive deep into each aircraft's performance. The planes I did test loaded just fine. The visual quality of the aircraft overall seemed a bit less than what I expected. Some aircraft had noticeable bleed-through and "non-smooth" surfaces. I checked the dates on the model files of the aircraft, and they seemed to be a little older than I expected. This means they have not been updated with any new technology like moving flaps, gear, ailerons, rudder and so on. The actual performance of each aircraft was not bad. You can tell, like when flying the Stealth Bomber from Meigs Field, that the performance may not be exact.



The Legendary Aircraft Suite 1.1
Aviation Classics
Bob Hoover's P-51D
Boeing 314 Clipper
Boeing Super Stearman
Curtiss JN-4D Jenny
Fokker Dr.I Triplane (Red)
Fokker Dr.I Triplane
Gee Bee Model R-1 No 11
Laird Super Solution
Lockheed Model 10
Miles A.Atwood Special
Spirit of St. Louis
Travel Air Mystery Ship 98
Wedell-Williams 844
Wright Flyer
Select All
Select None
Settings
Exit
Orville Wright first piloted this heavier than air machine into the sky at 10:35 AM on December 17, 1903 at Kitty Hawk, NC after a failed initial attempt by his brother, Wilbur. The first successful flight lasted 12 seconds and covered 120 ft.

Panels

About 37 different instrument panels for the various types of planes (multi-props and multi-jets, planes with landing gear and those without, military and commercial planes and so on) are installed with the package. A lot of the planes look alike, and it is noticeable when you switch from a 1930's plane to a modern general aviation plane and they have the same panel! Over all, the panels themselves are pretty good. They are certainly better than stock or default panels and were not rushed to be put together.

Conclusion

I will be holding on to this CD. I found this to be the perfect place to find unusual and hard-to-find aircraft like the Spirit of St. Louis, Amelia Earhart's Lockheed L-10 E, the Wright Brothers Flyer and the Stealth Bomber all on one CD! The models may not be perfect, but the experiences are fun in any event. I will use the planes to experiment with moving parts, creating instrument panels, adjusting flight dynamics and perhaps repainting aircraft. If you know someone who likes all types of aircraft, this is a great CD not only for the addition to FS and the Flight Planner, but for the bit of history on each plane found in the manual and in HTML format on the CD-ROM.

For More Information

The Associates
Units A2/A3 Edison Road
St. Ives, Cambridgeshire
PE17 4LF United Kingdom
http://www.flightsim.co.uk

Creatools

by Phil Paschutine

Not too long ago, the first Flight Simulator design programs were beastly to understand and nightmarish to use. Then we relied heavily on experienced scenery designers for guidance, as the documentation for these programs was skimpy at best. Needless to say, there were only a few really experienced designers, and many of them were reluctant to share their knowledge.

Experienced designers can get away with not reading a new program's manual or just leafing through it to learn about new features. On the other hand, new scenery designers must read the whole manual, which they often do not do, thinking the graphic user interface (GUI) will be easy to understand. They soon realize that they are not getting anywhere, and the program will likely gather dust on the shelf.

For those who are reluctant to read a manual and do not want to spend the necessary time to learn, I may have found the first object design program that was made with the novice in mind. *Creatools* is a suite of seven design utilities that will help you to create scenery objects for FS 98 and FS 2000 with just a few mouse clicks.

Installation and on-line help

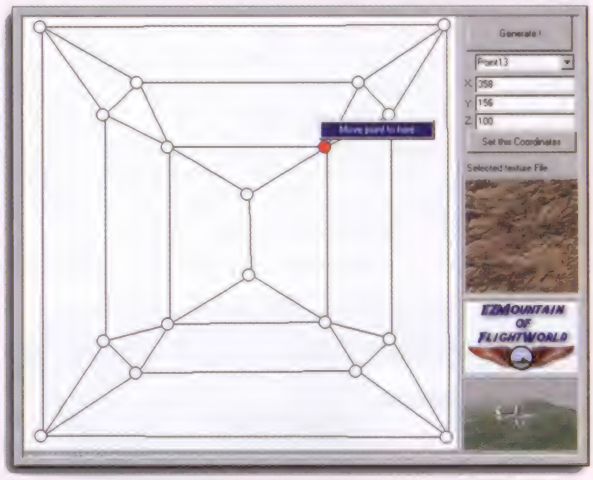
Installation is automated and works perfectly. The program comes in both English and French (you can switch from one to the other on the fly). You can choose the size of the installation from typical, compact or custom.

The main program interface for the scenery tools

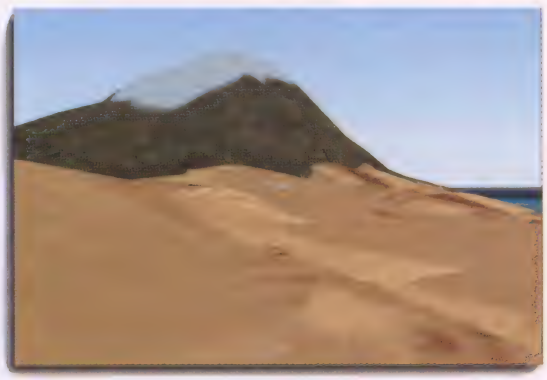
The help file is simple and includes all you need to know, so the learning curve is very short. Generally, you can start creating 3-D objects and adding to your scenery in mere minutes. *Note: Do not install to a "Program file" directory, or you will get SCASM compilation error messages.*

EZMountain

EZMountain includes two mountain structures, from which you can create simply and complexly shaped mountains in less than a minute. Then select a texture for the whole mountain and click the Generate! button. *Note: If you quit the EZMountain window, you will need to start from scratch.*



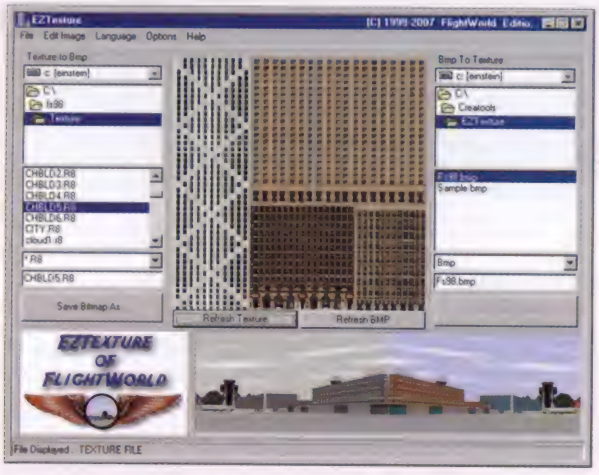
To modify the shape of your mountain, change the position of any point by clicking on it and moving the mouse cursor to a new position.



Example of a resulting mountain in your FS scenery

EZTexture

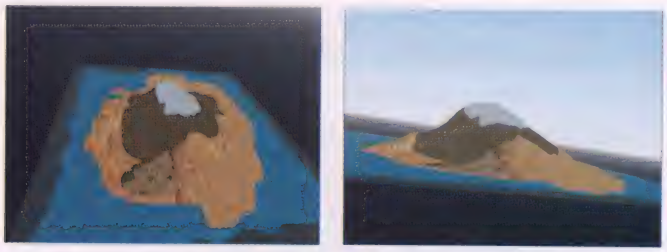
EZTexture is an FS texture/bitmap viewer and converter. Load any type of FS texture and convert it to a standard .BMP file. You can access your favorite paint program to edit the image, save it as a bitmap and convert it to the special RAW format (.R8, .PAT, .TXR, .OAV, etc.). *Note: Do not flip the .BMP when saving it.*



You can load an FS texture and a bitmap at the same time and view each image in turn.

EZRelief

EZRelief builds elevated mesh terrain for FS 98, CFS and FS 2000. It applies an elevation map created in any paint program.



The completed terrain relief grid in Flight Simulator

The Start position option allows you to define a start location complete with altitude, heading, nav, OBS and comm settings. You will find your start position entry in FS's **World | Goto** menu under "Scenery from 6.0 and before."

If you are not familiar with mesh terrain and elevation maps, I strongly recommend reading the tutorial in the help file. Creating an elevation map in *Paint Shop Pro* requires some effort, and you need to be familiar with the use of the gradient tool. I have created the island example since it came with its own elevation map, but I still don't know how create my own elevation map!

EZDots

EZDots creates a square (maximum 1,000 x 1,000) in which illuminated dots will be seen. This is a nice, fast way to create your own city night lights. Altitude must not include any decimals or you will get a compilation error. This option does not work in FS 2000.

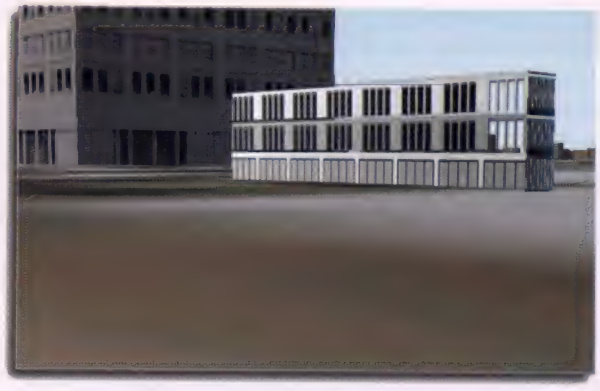
The EZDots design feature

EZBuilding

EZBuilding is perhaps the most interesting element of *Creatools*. With it you can create buildings (with inside textures), trees, walls and houses. For some reason, the roofs are just colors. The ability to texture the roofs would have been a nice feature.

Objects can be made to spin, and the hard surface option will enable you to create elevated helipads and such. You can use the wall object to create walls and fences, of course, but also billboards and transparent gates and to add day and night textures and an automatic invert of the bitmap on the reverse side.

Once you have selected the object and set the size variables, select your textures. You no longer need to manually enter the data points of the texture, just select one corner of the texture and extend to the other corner with the mouse. You are done!



In September I had told FlightWorld Editions product manager, Christian Fonck, that although an object can be saved in as many .API files as there are size and texture possibilities, I had strong reservations about the small number of objects in the library. He told me that he had been thinking about this for some time, and while only those five object types are possible in the initial release, a patch would be issued later to add more objects, such as cars, planes, etc. Although the program is constantly being upgrading, this version still includes only five objects.

EZApi

EZApi will create custom objects and allow you to either generate macro code for the *Airport* freeware design program (.API format) or a stand-alone .BGL scenery file for each individual object.

EZApi imports an .API file generated by EZBuilding, EZDots or EZMountain and compiles it to a .BGL file using SCASM V2.19 (32). The object can be offset, rotated and scaled.

EZShot

EZShot is a utility that can take multiple screen captures without the need to quit or minimize FS 98 or any other applications. Start EZShot and press the print screen key to capture screens. Each screenshot can be seen in the main window, or the whole screen capture session can be viewed as a slideshow. Each image is saved automatically as a .BMP file using the name you wanted it saved under, and the program will add an underscore and two-digit number right after the name.

The EZShot utility

Conclusion

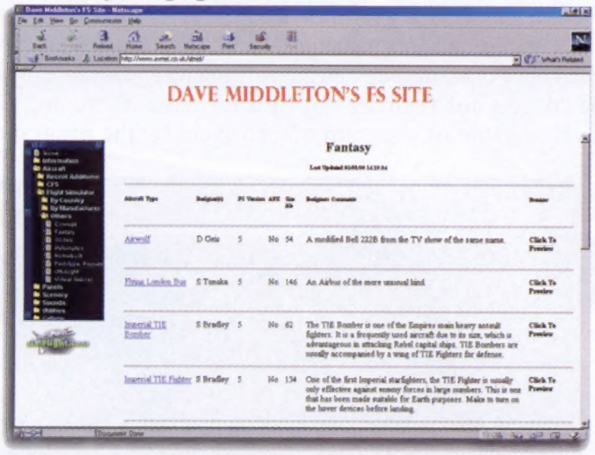
Experienced designers who use programs such as *Airport and Scenery Designer* (ASD), *Airport*, *Dday*, *Terrabuilder* or *Visual Object Designer* 3.0 and who are somewhat familiar with the SCASM scenery compiler will not feel the need to use *Creatools*. Less-experienced designers who do not want to use another 3-D object design or mesh terrain program (and spend time reading the manuals) and would like to create objects with a few mouse clicks will find it useful. Flight simmers with no design knowledge who wish to enhance their flight areas in a few minutes will find *Creatools* to be well suited for their needs before moving on to more advanced scenery design programs.

For More Information

Flightworld
Authors: Christian Fonck and Matthieu Laban
http://www.flightworld.org
(go to the Download section)
SRP: End-user $28 / Commercial $200

Web Watch Internet Sites for Simmers

— *Continued from page 57*

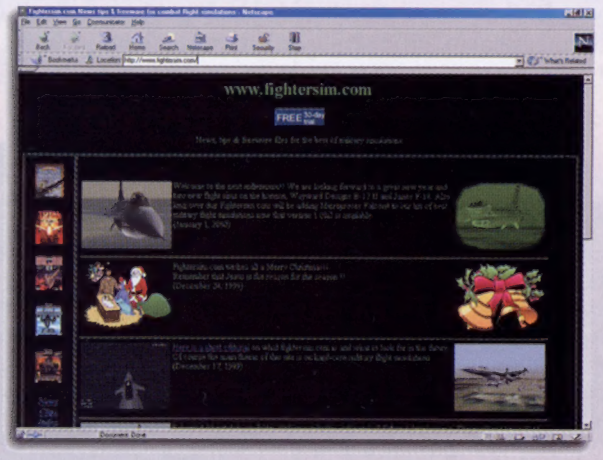


Panels are separated by CFS and FS panels, then by the country of origin for the CFS planes and the plane style for FS planes. Scenery is organized by country and the utilities by the type of utility. The Sounds are separated according to the style of aircraft. The image gallery contains aircraft pictures, and the Links page includes main sites and FS-related sites.

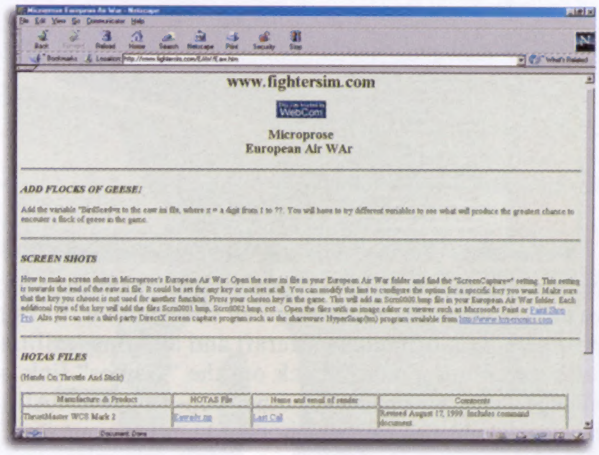
The best part of the page is the information section. Here you can find information on installing FS 98 aircraft, converting aircraft, a general FAQ section and even information on the Force Feedback joysticks. All in all, this is a great place to visit, and don't be afraid to hit the Bookmark button on the overhead panel. If you need assistance, this page will assist you with your Flight Sim needs.

Fightersim.com

Be sure to have the oxygen mask secure and your seatbelt fastened for our next stop at http://fightersim.com. As your pilot, I like the layout of this site. You get a wide variety of graphics, but not too many to slow you down much. A nice feature about the site is the news and information section. If you are having trouble with a fighter-style game, here is the place to look for a solution. The site contains a lot of information and has e-mail links!



It appears as though this site's author prefers *Falcon 4.0* over other fighter games due to the amount of information available on the site for it, but it is a great place to get information on games like *Falcon 4.0*, *Total Air War*, *Jane's F-15*, *Long Bow 2* and more. This is a must-see site to feed the dog-fighter in all of you!

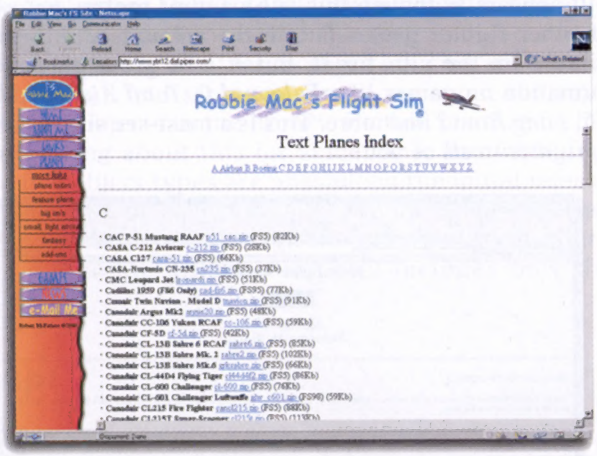


Robbie Mac's Flight Sim site

For the people who want to have every plane ever made for FS, our next stop will help their dream. Http://www.ybt12.dial.pipex.com is a great place to look for a specific aircraft.

The aircraft are sorted by name and some by company. Most of the links point to the trusty old FTP site FS simmers know well: ftp://ftp.iup.edu/. The advantage of this site over the FTP is that:

- You don't have to wade through all the weird file names
- They are organized for you by aircraft type
- You know before you download which version the aircraft is in (FS 5, FS 95, FS 98, etc.)
- You don't have to wait for the seemingly endless list of files to be displayed from the FTP site.

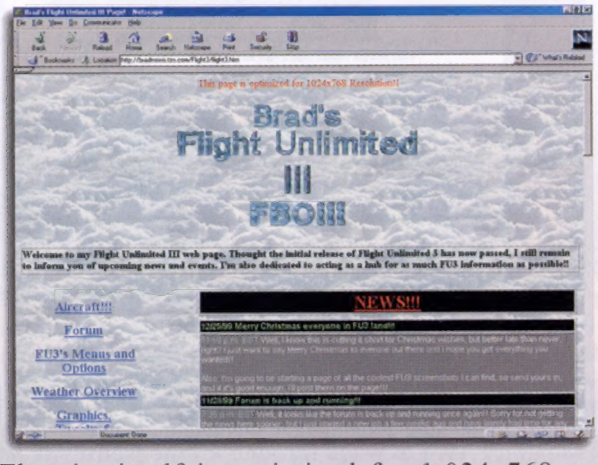


Aside from the list of available planes on the site, you will find information about the Web site's author, links and a humble selection of fantasy aircraft and add-ons (utilities). If you are into other games, check out the "Games" link on the main page for some cheats for other non-FS games. All in all, this is a nice site for a visit. I hope you enjoy your stay.

Brad Morris' Flight Unlimited III site

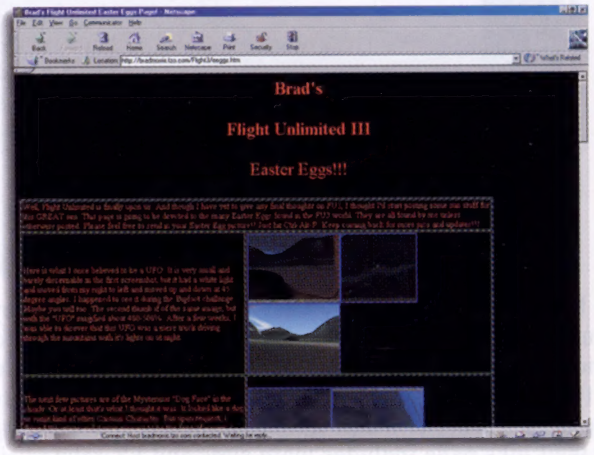
Ladies and gentleman, this is your Captain speaking. Unfortunately, our fuel quantity is below expectations, and we will be unable to complete our journey. We will be forced to make an involuntary water landing. Please stand up, remove the cushion from your seat and HOLD ON!

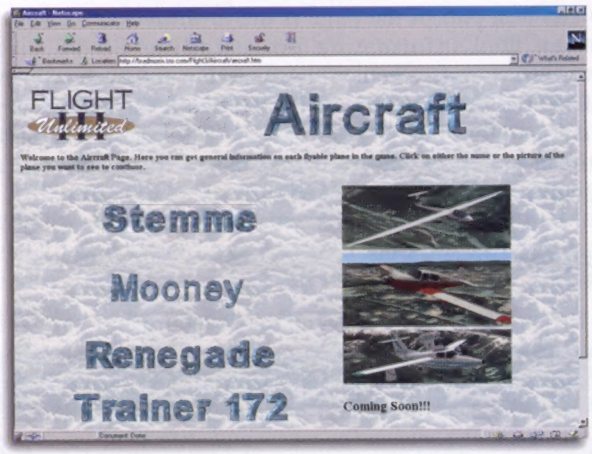
Looking out the left side of the aircraft you will see http://bradmorris.tzo.com/flight3/flight3.htm. For *Flight Unlimited III* (FUIII) users, here is a great place to stay afloat of the latest information on *Flight Unlimited III*.



The site itself is optimized for 1,024x768 screen resolution, but a lower screen resolution can be used if you like the scroll bar!

This site contains links for aircraft, an FUIII forum, FUIII's Menus and Options, a Weather Overview, Graphics, Tweaks & Performance, Night Flight and Easter Eggs. For those of you not familiar with Easter eggs, these are hidden items in a game or program placed there by the programmer.





For a breakdown of the aircraft and general information FUIII (including available patches), this is a must-visit site.

Well, the FAA has taken my pilot's license...again (but I only need two more cereal box-tops to get my new one)! Until next time, remember: don't try an aileron roll when flying five feet off the ground—wait until you are a bit higher!

Professional Flying...

The MD-83 Captain's panel on climb out...

MD-83 centre panel with comms, autopilot and engine read-outs.

The Boeing 747-400 Captain's view at Zurich with 'glass cockpit' panel.

The Boeing 747-400 centre panel view shows important information clearly.

AIRLINE SIMULATOR 2™

...Real Simulation

Fed up with all 'out of the window fancy graphics' AND NO REAL flying? If it is flying realism you want then Airline Simulator 2 is the simulator you have been waiting for!

- Developed by real airline pilots and aviation professionals over three years
- The most realistic aircraft handling ever achieved on a PC-based flight simulation with all new flight models of MD-83, MD-88 and B747-400 aircraft. Plus additional aircraft, including B737, B767, B747-357, A320 and Shorts 360.
- Vast scenery base with enhanced 256 colour Europe and North Atlantic scenery over 1,600 airfields covered in detail! USA Continental scenery now included too!
- Highly sophisticated flight equations based on true inertia systems and detailed airflow calculations and forces Programmed with accuracy up to FL500!
- Wind turbulence, rain and snow as well as runway surface calculations allow realistic ground handling
- Explore the edges of the aircraft flight envelope.....You deal with asymmetric lift, asymmetric drag, flamed out engines and much more.
- Aircraft Abstraction Layer (AAL), the technology behind the new flight model makes flying easy, and teaches the right, real world handling techniques used by real world pilots
- Autopilot, Main Control Panel (MCP), Flight Management Computer (FMC), Thrust Computer, Ground Proximity Warning System (GPWS), Traffic and Collision Avoidance System (TCAS) and many more systems.
- Aural Alarms (e.g. GPWS, TCAS, configuration alarms), voice communication with the first officer and improved sounds for touch down, stall warning and other aircraft related sounds have been implemented using real world sounds.
- Fly with TRUE 3D! Red-green anaglyph glasses are included to let you take advantage of the 3D Advanced Graphics System module included.
- Multi-player flight simulation via IPX Network. Up to 4 planes can see each other with external visuals together with proper TCAS simulation. The included Scenery Viewer (called Ernie) allows you to view scenery and is useable as a radar screen for networked multi-player sessions.
- Comprehensive manual including 150 pages of authorised reproductions of Aerad airport and ILS charts. Further, 3 authorised reproductions of Aerad en-route charts covering Europe and North Atlantic are included as well as checklists for the MD-83, MD-88 and B747-400 aircraft.

IMPORTANT – AIRLINE SIMULATOR 2 IS A HIGHLY DETAILED FLIGHT SIMULATION EXPERIENCE. ONLY EXPERIENCED PC PILOTS SHOULD APPLY!

Available in the USA from
FLIGHT 1 SOFTWARE
http://flight1.com
Tel: 1-877-PC Pilot

Published in Europe by
The Associates
http://flightsim.co.uk
Tel: +44(0)1494 511103

Developed by
NOMISSOFT
Danur CFS
virtuali

Flight Sim Central

Strapping you in the cockpit of desktop aviation!™

Fly it Right!

SIMCharts by Jeppesen is innovative, stand-alone software that allows flight simulator users the ability to Sort, View, and Print realistic Jeppesen Terminal Charts (SID's, STAR's, Approaches, and Airport Diagrams). All of the terminal charts for each particular coverage area are conveniently contained on CD. The entire WORLD is available to you, right from your CD drive! In order to add even more realism to your flight simulation experience, Jeppesen also offers LO Altitude enroute charts for the U.S. and European coverage areas. The SIMCharts by Jeppesen Combination Package provides both the CD of terminal charts and corresponding paper enroute charts. Please call for individual pricing and area availability!

SIMCHARTS – USA TERMINAL BUNDLE

$49.95

The best Yet!

Flight Simulator 2000 Professional is the PC-based civilian flight simulator for the new millennium. Built on a foundation of realism that spans over 16 years, Flight Simulator 2000 Professional is the largest leap forward in the history of the franchise. With new aircraft, new cities, more than 20,000 airports worldwide and much more, Flight Simulator 2000 is poised to launch a new era in the Flight Simulator franchise. Featrues new scenery, new aircraft, over 20,000 airports world-wide, new cities in greater detail, Real-Time ATC, Moving Map/GPS, Flight Dynamics Editor, Instrument Panel Editor and many other new features! Standard version Flight Simualtor 2000 also available –

FLIGHT SIM 2000 PRO

$69.95

Missile, Comrade?

This second-generation military flight sim is state-of-the-art! Flanker™ 2.0 offers stunning graphics and streamlined playability—all without compromising the technical excellence of its famous predecessor! Previously classified Russian satellite imagery is used to generate a detailed 3D world with fully texture-mapped terrain. Boasting a full, dynamic campaign editor, SU-27 Flanker 2.0 provides users with a feeling of total immersion in a realistic and accurate theater of operations environment. New users will be delighted by the intuitive menu system and all users can hone their pilot skills in a fully interactive training session—complete with an in cockpit instructor!

FLANKER 2.0

$44.95

License to Fly!

Featuring fully interactive gauges, switches and knobs along with excellent flight modeling, Fly! will put you behind the stick like no other PC-based flight simulation has before. Realistic radio procedures allow you to communicate with ATC and other pilots. Onboard navigation equipment lets you navigate the world at will, or you can use the extremely detailed terrain to navigate VFR. In short, this one won't leave you wanting more! Choose from five different aircraft to fly: Piper Malibu Mirage, Beechcraft King Air B200, 172R Skyhawk, Piper Navajo Chieftain, Raytheon Hawker

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Climb the pyramid to be the top pilot of the most advanced air force in the world: the USAF. Fly and train over US soil in the F-16C Falcon and A-10 Warthog or an arsenal of six other planes. Then relive great historic air battles flying the rugged F-4E over Vietnam or the powerful F-15C in Operation Desert Storm. Finally, push the envelope flying the menacing F-117 Stealth Fighter and ultra-modern F-22 Raptor as you project the power of the United States in futuristic campaigns over Europe. If that's not enough, take your skills to the net flying against other aces on JanesCombat.Net.

JANE'S USAF

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General Aviation Hangar

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